

E-SOLUTIONS



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1. Products and applications

The table shows products recommended for various applications.

	Buildings																											
	Heating							District heating											Air-conditioning									
	Main pumps	Boiler shunt pumps	Mixing loops	Heat surfaces	Heat recovery	DHW recirculation	DHW production	Main pumps	Booster pumps	Distribution pumps	Boiler shunt pumps	Low heating pumps	Air-separation pumps	Flow filter pumps	Replenishment pumps	Pressure-holding pumps	Temperature shunt pumps	Mixing loops	DHW pumps	DHW production	Primary pumps	Secondary pumps	Condenser	Cooling tower recirculation	Heat recovery	Pressure-holding pumps	Tertiary pumps	Mixing loops
MAGNA	●	●	●	●	●	●	●	●										●	●	●	●	●	●	●	●		●	●
TPE Series 2000	●		●					●										●			●	●					●	●
E-pump TPE	●	●	●	●	●	●	●	●		●	●	●	●	●			●	●	●	●	●	●	●	●	●		●	●
E-pump NBE	●	●	●					●		●	●	●	●	●	●		●	●			●	●	●	●	●		●	●
E-pump NKE	●	●	●					●		●	●	●	●	●	●		●	●			●	●	●	●	●		●	●
E-pump CRE									●						●	●										●		
E-pump CME									●						●	●										●		
Hydro MPC									●																	●		
Control MPC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Control MPC Series 2000	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
CUE (frequency converter)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●
MP 204 (motor protection)	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●
Control MP 204															●													
R100	●	●	●	●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Grundfos GO	●	●	●	●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 100/100 LONWorks	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 150 Profibus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 200 Modbus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 250 GSM/GPRS/SMS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 300 BACnet	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CR Monitor									●						●	●										●		
LiqTec									●						●	●										●		
CU 300/CU 301															●													

	Buildings															Industry							
	District cooling						Pressure boosting					Wastewater				Fire	Industrial applications						
	Primary pumps	Secondary pumps	Condenser	Pressure-holding pumps	Booster pumps	Tertiary pumps	PB with break tanks	PB with direct connection	PB with roof tanks	Transport to roof tanks	PB zone-divided	Wastewater from basement	Drainage	Surface water	Sewage	Dewatering	Jockey pumps	Constant pressure	On/off pressure control	Boiler feed	Level control	Wash 'n' clean	Filter application
MAGNA	●	●	●			●																	
TPE Series 2000	●	●				●																	
E-pump TPE	●	●	●			●																	
E-pump NBE	●	●	●			●																	●
E-pump NKE	●	●	●			●																	●
E-pump CRE				●	●		●	●	●	●	●						●	●	●	●	●	●	●
E-pump CME				●	●		●	●	●	●	●						●	●	●	●	●	●	●
Hydro Multi-S							●	●	●	●	●												
Hydro Multi-E							●	●	●	●	●												
Hydro Multi-B							●	●	●	●	●												
Hydro MPC							●	●	●	●	●												
Control MPC	●	●	●	●	●	●	●	●	●	●	●							●	●	●	●	●	●
Control MPC Series 2000	●	●	●			●																	
CUE (frequency converter)	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●
MP 204 (motor protection)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Control MP 204										●		●	●	●	●	●	●		●	●	●	●	
R100	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Grundfos GO	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 100/100 LONWorks	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						
CIM-CIU 150 Profibus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 200 Modbus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 250 GSM/GPRS/SMS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						
CIM-CIU 300 BACnet	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						
CR Monitor				●	●		●	●	●	●	●						●	●	●	●	●	●	●
LiqTec				●	●		●	●	●	●	●						●	●	●	●	●	●	●
Multilift												●			●								
SEG AUTO _{ADAPT}														●	●	●							
LC/LCD												●	●	●	●	●					●		
Control DC (Dedicated Controls)												●	●	●	●	●					●		
IO 113 signal converter												●		●	●								
SM 113 signal converter												●											
Prefabricated pumping stations													●	●	●								

	Municipal waterworks/wastewater																		
	Water intake			Treatment process					Water distribution			Wastewater transport					WW treatment		
	Groundwater	Surface water	Seawater	Filtration/backwash	Chemical treatment	Disinfections	Flocculation	Sedimentation	Pumping station	Water towers	Boosting	Main pumping stations	Pressurised systems	WWTP inlet stations	Network and prefabricated pumping stations	Flood control	Biological treatment	Sludge management	Mechanical treatment
E-pump NBE	●	●	●	●	●		●												
E-pump NKE	●	●	●	●	●		●	●											
E-pump CRE	●	●	●	●	●	●	●	●	●	●	●								
E-pump CME	●	●	●	●	●	●	●	●	●	●	●								
Hydro Multi-S											●								
Hydro Multi-E											●								
Hydro Multi-B										●	●								
Hydro MPC									●	●	●								●
Control MPC	●	●	●	●	●	●	●	●	●	●	●								
CUE (frequency converter)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
MP 204 (motor protection)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Control MP 204	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●
R100	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●
Grundfos GO	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●
CIM-CIU 150 Profibus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 200 Modbus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CIM-CIU 250 GSM/GPRS/SMS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CR Monitor	●	●	●	●	●	●	●	●	●	●	●								
LiqTec	●	●	●	●	●	●	●	●	●	●	●								
CU 300/CU 301	●																		
SQFlex	●																		
Dosing and disinfection	●	●	●	●	●	●	●	●	●	●	●	●					●	●	●
HydroProtect											●								
SEG AUTO _{ADAPT}													●		●				
LC/LCD													●		●				
Control DC (Dedicated Controls)								●				●	●	●	●	●	●	●	●
IO 113 signal converter												●		●	●	●		●	●
SM 113 signal converter														●	●				
Prefabricated pumping stations													●		●				

2. Solutions

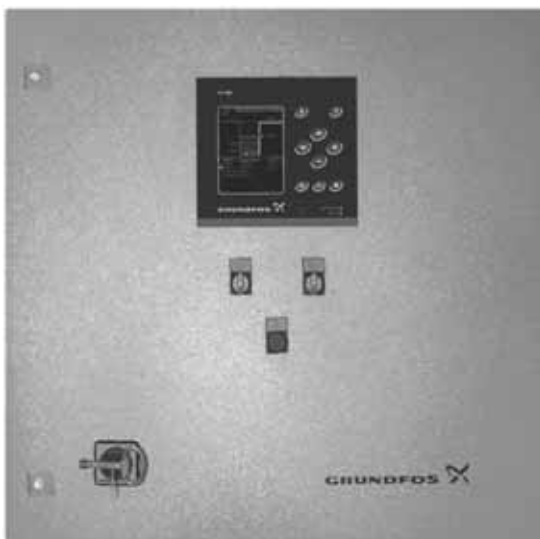
Control Dedicated Controls

Introduction

Grundfos Dedicated Controls is a control system designed for installation in either commercial buildings or network pumping stations with up to six wastewater pumps and an optional mixer or a flush valve.

Advanced control and data communication are also possible with the Grundfos Dedicated Controls system. This data booklet deals with the components available for the production of Dedicated Controls control cabinets that can monitor and control up to six wastewater pumps.

The components have to be ordered according to the desired functions. Grundfos will then tailor the control cabinets to the specification.



TM05 5244 3512

Fig. 1 Example of Dedicated Controls control cabinet

Pumps supported

The Dedicated Controls is designed to control and monitor the Grundfos wastewater pumps listed below:

- SEG
- SE
- DP
- EF
- SL
- S.

Similar wastewater pumps of other makes can also be controlled by the Dedicated Controls system.

Components

Main components of the Dedicated Controls system for up to six pumps:

- CU 362 control unit
- up to three IO 351B modules (general I/O module)
- up to six IO 113 protection modules (optional)
- up to six MP 204 motor protectors (optional accessory)
- up to six CUE or VFD frequency converters (optional accessory).
VFD refers to all other frequency converters than Grundfos CUE.

Grundfos recommends as standard:

- two-pump installations:
one IO 351B, two IO 113, etc.
- three-pump installations:
two IO 351B, three IO 113, etc.
- four-pump installations:
two IO 351B, etc.
- six-pump installations:
three IO 351B, etc.

Note: If further I/O ports are required, an additional IO 351B module can be installed.

Easy operation on site or remotely

The CU 362 control unit is a combined controller and user-friendly control panel. The control panel consists of nine buttons and a large graphical LCD display. On the CU 362 operator display, the current status of the system is shown. The actual positions of the pumps, mixer and measuring sensors are shown in the display. See fig. 2. The individual displays have explanatory help texts for the settings to be made in the display.



TM05 5238 3512

Fig. 2 CU 362 operator display

Controller-optimised software

Software algorithms for optimisation of the pump operation are based on Grundfos' long experience in pump control systems.

Easy monitoring, control and configuration

Dedicated Controls is easy to configure with the built-in step-by-step configuration wizard or the PC Tool WW Controls available. The wizard helps the user to configure the system during start-up. Subsequent monitoring, control and configuration can be done via the following:

- CU 362
- PC Tool WW Controls
- SCADA system.

Communication

Dedicated Controls can communicate in many different ways. Wireless remote control is available throughout the world, using a PC or mobile phone.

Level measurement

The Dedicated Controls system starts/stops the wastewater pumps by means of float switches, an analog-pressure sensor or an ultrasonic sensor. Furthermore, it is possible to control the water level by both float switches and/or an analog pressure sensor. Two additional safety float switches can be installed in the Dedicated Controls system. These are high-level and dry-running float switches.

Protection modules

Each pump in the Dedicated Controls system can be protected and monitored by various I/O and protection modules:

- IO 351B
- IO 113 and SM 113
- MP 204.

Data communication

Internal communication

Communication between the CU 362, IO 351B, IO 113, MP 204 and CUE is established via Grundfos GENIbus.

External communication

The Grundfos Dedicated Controls system can communicate with external units such as

- PC
- mobile phone (SMS commands)
- SCADA/BMS systems.

Communication line and data protocols

Dedicated Controls is ordered either with or without a built-in CIM communication interface module. The communication module to be used depends on the fieldbus protocol and the communication line.

To establish communication between the Dedicated Controls system and a SCADA system, the CIM module must be configured. The configuration of the CIM module is easily carried out via the CU 362 operator display.

Dedicated Controls supports the following Grundfos CIM modules:

CIM module	Protocol	Line carrier
CIM 050	External GENIbus	Cable, RS-485
CIM 150	Profibus DP	Cable, RS-485
CIM 200	Modbus RTU	Cable, RS-485
CIM 250	Modbus/SMS messaging	GSM/GPRS
CIM 270	GRM*	GSM/GPRS

* GRM = Grundfos Remote Management

Grundfos Remote Management

Grundfos Remote Management is an easy-to-install low-cost solution to monitoring and management of Grundfos products.

Approach to Grundfos Remote Management

- Centrally hosted database and web server.
- Data collection using SMS/GPRS.
- Users only need an internet connection and a standard web browser to monitor and manage their own pump installation.

Radio modem

Dedicated Controls supports communication via radio modem. The radio modem has to communicate via an RS-485 connection. The CIM 200 Modbus module is used as an interface between the CU 362 and the radio modem. The communication line is established by using an RS-485 serial cable.

Features and benefits

The Grundfos Dedicated Controls system offers the features and benefits below:

Basic features

- Pump start/stop
- alternating operation of pumps
- overflow detection
- overflow measurement
- alarms and warnings
- advanced alarm schedules
- start and stop delays
- free language selection.

Advanced features

- User-defined functions
- alternation between groups
- start level variation (reduced sedimentation)
- combi alarms
- daily emptying
- foam draining
- anti-seizing (limestone)
- safety after-run delay
- mixer or flush valve
- maximum number of started pumps
- pump flow measurement
- system flow measurement
- pump flow calculation
- system flow calculation.

Additional features, IO 113

- Monitoring of insulation resistance
- monitoring of moisture in motor
- monitoring of water in oil.

Additional features, MP 204

- Anti-blocking
- monitoring of voltage
- monitoring of current
- monitoring of current asymmetry
- monitoring of phase sequence
- monitoring of $\cos \varphi$ (power factor)
- monitoring of power
- monitoring of energy
- monitoring of insulation resistance
- monitoring of temperature, Pt100/Pt1000
- monitoring of temperature, PTC
- monitoring of temperature, Tempcon.

Additional features, CUE or VFD

- Anti-blocking
- automatic energy optimisation
- specific-energy test
- output frequency
- monitoring of voltage*
- monitoring of current*
- monitoring of phase sequence*
- monitoring of power*
- monitoring of energy*
- monitoring of torque*
- reverse start
- run flushing
- stop flushing
- PID control.

* These functions are only available with a Grundfos CUE.

Communication features

- Complete overview of the pump installation
- setpoint change, resetting of system and start/stop of pumps
- access to complete alarm/warning log
- automatic redirection of alarms and warnings to the on-duty staff
- optimisation of your maintenance and service program
- reduction in energy consumption of the system
- Modbus RTU communication via cable
- Modbus TCP communication via GSM/GPRS
- SMS commands (send/receive)
- SMS schedule
- VNC connection for migration of user interface to a web browser.

Benefits

- **Automatically energy-optimised operation**
To ensure the lowest possible specific energy consumption [kWh/m³], Dedicated Controls continuously learns and adapts to the operating conditions in the specific pumping system. The CU 362 immediately adapts the pump speed to data received from the frequency converter (Grundfos CUE) and a flowmeter. Specific energy consumption can also be provided by the electronic motor protector (Grundfos MP 204). This gives a continuous overview of pump efficiency, enabling timely service and maintenance.
- **Anti-blocking**
The "flushing and reverse start" function prevents clogging caused by the increasing amount of fibrous components and solids in sewage nowadays. The anti-blocking function acts on any abnormal event to prevent pumps from being blocked, thus avoiding costly downtime.
- **Flexibility to local adaptation**
Dedicated Controls has a number of free inputs and outputs for additional sensors (e.g. temperature sensors) or additional relays (e.g. valve operation). Highly intuitive set-up via the large operator display or via Grundfos PC Tools, i.e. without any additional programming.
- **Service-cost-optimised installation and operation**
Dedicated Controls can send and receive SMS messages, for example alarms and warnings via SMS. Use the easy-to-configure rotating week schedules to plan ahead.
- **Easy installation and configuration**
Dedicated Controls is easy to configure via the configuration wizard, and more installations can be configured by uploading an already configured installation file via Grundfos PC Tool WW Controls.
- **Electrical overview for easy maintenance via the CU 362 operator display**
- **Help texts for the Status, Operation, Alarm and Settings menus shown on the operator display**
- **Advanced data communication**
Dedicated Controls can be monitored and controlled remotely, either via a GSM/GPRS connection or via Grundfos Remote Management web server.
- **Advanced alarm and warning priority**
Dedicated Controls supports combi alarms. This means that two alarms have to be active before the system indicates an alarm.
- **PC Tool support**
Dedicated Controls supports the Grundfos PC Tool WW Controls and PC Tool Water Utility. Both tools are used to configure the Dedicated Controls system, either on site or remotely.
- **VNC (Virtual Network Computing)**
In places where an Ethernet connection is available, the CU 362 can be remotely controlled by the VNC solution over Ethernet.
- **GSM/GPRS, SMS (transmit and receive), SCADA, BMS and PLC support**
- **Data logging such as alarms, runtime, flow, overflow, volume, energy, etc.**

Standard version



TM05 5240 3512

Fig. 3 DC control panel

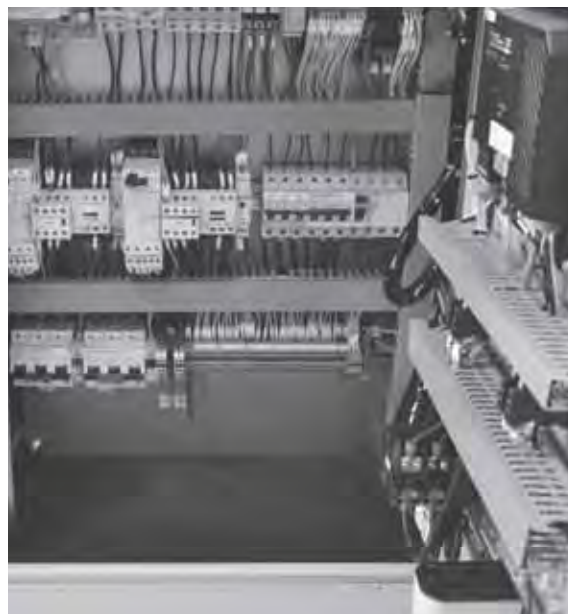
Standard version:

- Metal cabinet with single door, closed with system lock
- CU 362 in front door for easy access
- main switch (Work-0-Generator)
- terminals for external power generator supply input
- pump switches (Automatic-0-Manual)
- outside service plug 3 x 400 V
- inside service plug 230 V
- Work light inside panel
- alarm lamp (no alarm siren signal)
- motor starters:
DOL, star/delta, softstarter
electronic protection (MP 204)
variable speed drive (CUE)
- phase control
- short-circuit protection
- overcurrent transformer.

Options and accessories

Options for upgrading DC control panel:

- Metal cabinet with double-door system
- version for outdoor placement
- frame for wall mounting
- panel stand for cement or foundation mounting
- 2 sets of patented locks and keys
- lamp with alarm siren signal
- ammeter for each pump installed in door
- sensor module (IO 113) for e.g. water-in-oil sensor and temperature sensor (pt 100)
- sensor level measurement set:
set of MPS analog sensor + 2 units of Grundfos SLC 10 E level regulators
- communication options incl. antenna and battery or sold separately
- mixer option up to 1.5 kW with contactor and protection.



TM05 2069 4311

Fig. 4 DC control panel

Specifications of DC control panel based on Grundfos Dedicated Controller

The Grundfos Dedicated Controller has been designed specifically for controlling one to six pumps in wastewater pumping stations. The large, highly intuitive, graphical user interface and the vast range of functionalities in the controller makes it very user friendly and flexible. The Dedicated Controller can also be integrated to most SCADA systems via a range of different communication protocols.

The wastewater pumping station controller must as a minimum meet the following specifications:

- Have a large (min. 90 x 120 mm) graphical display for easy overview and operation.
- Have easy to operate large buttons.
- Allow for easy setup and commissioning with start-up wizard and allow for free selection on language in the menu.
- It must be possible to activate all functionality without any programming.
- Operate pumps direct on line, via soft starter, auto transformer or variable speed drive.
- Allow for duty/standby and parallel operation of up to six pumps with any motor sizes.
- Allow up to nine digital and five analogue inputs from sensors with current 0-20 mA, 4-20 mA or voltage (0-10 V).
 - Allow level control by means of either level switches or an analogue pressure or ultrasonic level sensor or a combination of digital and analogue sensors.
- Allow connection of analogue water in oil sensor.
- Allow surveillance and handling of alarm conditions of PT100 or PT1000 sensors in pump bearings and/or windings.
- It must be possible to set start and stop delays in the controller.
- Allow integration to SCADA via GSM/GPRS using Modbus RTU or TCP/IP. Wired via RS-485 or radio modem. Send and receive SMS messages to up to three different numbers in event of alarm or as hearth beat signal. The use of the different numbers must be selectable via a scheduler function
- Ensure tripping or warning in these cases: overload, underload, too high motor temperature, overvoltage, undervoltage, power factor, current unbalance and loss of communication.
- It must be possible to operate the connected pumps in two logically different groups and to alternate between the groups.
- The controller must provide data logging such as alarms, runtime, flow, overflow, volume, energy, etc.
- The controller must provide an electrical overview of all inputs and outputs for service and maintenance persons.
- The controller must provide interlocking functionality to prevent overflow. The previous pumping station will delay pump starts and utilise the storage capacity in the network.

The controller must also be able to provide the following functionality:

- start level-variation (reduced sedimentation)
- daily emptying and foam draining
- anti-blocking
- safety after-run delay
- control mixer or flush valve
- pump flow calculation
- system flow calculation

The controller must also include the following functionality for VFD operated pumps:

- anti-blocking (**)
- automatic energy optimisation (*)
- specific energy test
- output frequency
- monitoring of voltage, current, phase sequence, power, energy, torque
- reverse start
- run/stop flush

(*) Automatically energy optimised operation

To ensure the lowest possible specific energy consumption kWh/m³, the controller must continuously learn and adapt to duty conditions in the specific pumping system. The controller must immediately adapt pump speed in response to data from the frequency drive and a flowmeter. Specific energy consumption can also be provided by an electronic motor protection. This gives a continuous overview of pumping efficiency, enabling timely service and maintenance of pumps and mains.

(**) Anti-blocking function

To prevent clogging caused by the increasing amounts of the fibrous component and solids in sewage today the controller should be able to "Flush or reverse" the sewage pumps. This anti-blocking function must act on any abnormal events to stop pumps from blocking.

Parameters to be monitored

- power factor, current, power
- low flow via flowmeter
- overtemperature (via PT100/1000)

The controller must be built into either a powder coated steel cabinet for indoor use with single or double door, and for outdoor use with double door. There are other options available, e.g. mounting frame or legs, door locking, to make installation safety. According to the local regulation main switch, generator connection, additional plugs for 1 x 230 V and 3 x 400 V, inner lamp are available.

The control cabinet must be fully documented with wiring diagrams and operating manuals.

Type key

Example:	Control DC	2x	1-1,6	DOL	(*)	(*)	(*)	3x400	IM	OPT
Type range										
Number of pumps										
Current range of pumps in ampere										
Starting method:										
DOL: Direct-on-line										
SD: Star-delta										
SST: Softstarter										
ESS: Frequency converter										
Number of pumps (group 2)										
Current range of pumps in ampere (group 2)										
Starting method (group 2):										
DOL: Direct-on-line										
SD: Star-delta										
SST: Softstarter										
ESS: Frequency converter										
Supply voltage										
Panel type:										
IM: Indoor, metal										
IP: Indoor, plastic										
OD: Outdoor, double-door										
OS: Outdoor, single-door										
OB: Outdoor, box in a box										
OPT: Options (if any, see nameplate for details)										

Control Multi Pump Control (MPC) - CU 352

Control MPC

Introduction

Grundfos Control MPC is a complete control cabinet with a built-in multi-pump control unit (CU 352), main switch, contactors, IO 351 modules, cabling, etc. It is designed for control and monitoring of up to six identical pumps connected in parallel. Control MPC comes with all necessary components and contains application-optimised software.

Applications

Grundfos Control MPC can be used for control and monitoring of both booster and circulation systems such as

- district heating systems
- heating systems
- air-conditioning systems
- district cooling systems
- industrial cooling systems
- booster systems
- industrial processes
- water supply systems.

Pumps

Control MPC is designed for systems with these pumps:

- CR(E), CRI(E), CRN(E)
- NB(E), NBG(E)
- NK(E), NKG(E)
- TP
- TPE Series 1000
- TPE Series 2000
- HS
- SP
- MAGNA, UPE Series 2000.

Note: The main pumps of the system must be of the same type and size.

Control MPC comes in four variants. See Product range and Overview of control variants.

Control MPC-E

For systems with two to six identical electronically speed-controlled pumps.

From 0.37 to 22 kW, Control MPC-E controls Grundfos pumps with integrated frequency converter, for instance CR(I)E, TPE and NKE.

As from 30 kW, Control MPC-E controls mains operated Grundfos pumps connected to external Grundfos CUE frequency converters (one per pump).

Control MPC Series 2000

For systems with two to six identical Grundfos Series 2000 pumps (MAGNA, UPE and TPE(D) Series 2000).

Note: Control MPC Series 2000 consists of a control cabinet, a built-in CU 352 and a main switch only. It cannot be equipped with for instance IO 351B modules.

Control MPC-F

For systems with two to six identical mains-operated Grundfos pumps connected to one external Grundfos CUE frequency converter.

Control MPC-S

For systems with two to six identical mains-operated Grundfos pumps.

Benefits

Perfect regulation and monitoring.



Fig. 5 CU 352

Control MPC offers perfect control and monitoring of the system and the individual pumps by means of the CU 352 multi-pump control unit.

The CU 352 features a wide range of local languages and application-optimised software. It is possible to enter pump curve data to optimise the performance and reduce the energy consumption.

Reliability

The Control MPC is not an ordinary controller! It is a dedicated multi-pump controller designed, made and tested by Grundfos. You are thus guaranteed long-lasting technology that delivers optimal wire-to-water efficiency.

User-friendliness

Control MPC features a built-in start-up wizard in a wide range of local languages that guides the installer through a series of steps until the system is correctly installed and commissioned. When the installation is complete, the simple, user-friendly interface makes sure that day-to-day operation is equally easy.

Flexibility

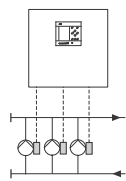
Control MPC is designed and built with a strong focus on flexibility.

The elements of the Control MPC can be combined in a number of ways. Even the software of the CU 352 is easily updated, meaning that we can build the perfect solution for you!

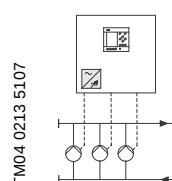
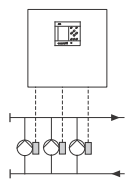
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Custom-built solutions

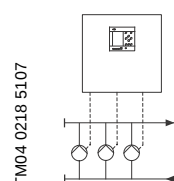
If this data booklet does not provide you with a solution that meets your specific control needs, please contact us.



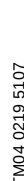
TM04 0213 5107



TM04 0213 5107



TM04 0218 5107



TM04 0219 5107

Control variant	Control MPC-E/EC	Control MPC Series 2000 ⁴⁾	Control MPC-F	Control MPC-S
Number of pumps	2 - 6	2 - 6	2 - 6	2 - 6
Motor size [kW] ¹⁾	0.37 - 75	0.37 - 22	0.55 - 75	0.37 - 75
Frequency converter				
Integrated, one per pump [kW] (E)	0.37 - 22	0.37 - 22	-	-
External Grundfos CUE [kW] (EC)	30 - 75	-	0.55 - 75	-
Operating conditions				
Ambient temperature [°C]	0 to +40	0 to +50	0 to +40	0 to +40
Relative humidity [%]	95	95	95	95
Enclosure class (IP class)	54	54	54	54
Functions				
Constant-pressure control	●	●	●	● ²⁾
Automatic cascade control	●	●	●	●
Alternative setpoints	●	●	●	●
Redundant primary sensor (option)	●	●	●	●
Min. changeover time	●	●	●	●
Number of starts per hour	●	●	●	●
Standby pumps	●	●	●	●
Forced pump changeover	●	●	●	●
Pump test run	●	●	●	●
Dry-running protection (option)	●	●	●	●
Stop function	●	●	●	● ³⁾
Password	●	●	●	●
Clock program	●	●	●	●
Proportional pressure	●	●	●	●
Pilot pump	●	●	●	●
Soft pressure build-up	●	●	●	●
Emergency run	●	●	●	●
Pump curve data	●	●	●	●
Flow estimation	●	●	●	●
Limit 1 and 2 exceeded	●	●	●	●
Pumps outside duty range	●	●	●	●
Log				
Battery back-up				
Setpoint ramp				
Estimated flow (E and EC)				
Communication				
Ethernet connection	●	●	●	●
External GENiBus connection (option)	○	○	○	○
Other bus protocols: PROFIBUS, LON, Modbus, PLC via Grundfos CIU communication interface units	○	○	○	○

- Standard.
- Available.
- Not available.

¹⁾ On request, control variants for control and monitoring of pumps with motors up to 315 kW are available.

²⁾ The pressure will be almost constant between H_{set} and H_{stop} . See page 17.

³⁾ Control MPC-S will have on/off control of all pumps. See page 17.

⁴⁾ For further information about Control MPC Series 2000, see page 15.

Control MPC Series 2000

Control MPC Series 2000 is a multi-pump controller designed for control and monitoring of up to six Grundfos MAGNA, UPE or TPE Series 2000 pumps. All pumps must be of the same pump type and size.

Control MPC Series 2000 is used for controlling circulator pumps in heating and air-conditioning applications.

Control MPC Series 2000 ensures optimal adaptation of the performance to the demand by closed-loop control of these parameters:

- proportional differential pressure
- constant differential pressure.

By means of an external sensor, Control MPC Series 2000 can also ensure optimal adaptation of the performance to the demand by closed-loop control of these parameters:

- differential pressure (remote)
- flow rate
- temperature
- temperature difference.

Type key

Example	Control MPC	-E	2 x	4	E	(*	(*	(*	3x380-415V, 50/60Hz, PE
Type range									
Subgroups:									
Pumps with integrated frequency converter (0.37 - 22 kW) - one per pump: -E									
Pumps with Grundfos CUE frequency converter (30 kW and above) - one per pump: -E									
Series 2000 pumps: Series 2000									
Pumps with external Grundfos CUE frequency converter: -F									
Mains-operated pumps (start/stop): -S									
Number of pumps with frequency converter									
Power [kW]									
Starting method:									
E: Electronic soft starter (pumps with integrated frequency converter)									
EES: Electronic soft starter (pumps with external Grundfos CUE frequency converter)									
Number of mains-operated pumps									
Power [kW]									
Starting method:									
DOL: Direct-on-line starting									
SD: Star-delta starting									
Supply voltage, frequency									

(* Code for custom-built solution.

Control cabinet

The control cabinet comes in grey coated steel with all the necessary components, such as a CU 352 multipump controller, main switch, contactors, IO 351 modules and cabling. If required, the control cabinet is equipped with a fan to lead away excess heat from for instance frequency converters.

Control cabinet variants

Control cabinets are for wall- or floor-mounting, depending on size.



Fig. 6 Floor- and wall-mounted control cabinet

TM04 0210 5107 - GrA5728

CU 352

The CU 352 multi-pump control unit of the Control MPC is placed in the door of the control cabinet.



Fig. 7 CU 352

The CU 352 features an LCD display, ten buttons and two indicator lights. The control panel enables manual setting and change of parameters such as setpoint. The CU 352 has application-optimised software for setting the system to the application in question.

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IO 351

The IO 351 is a module for exchange of digital and analog signals between the CU 352 and the remaining electrical system via GENIbus. The IO 351 comes in the variants A and B.

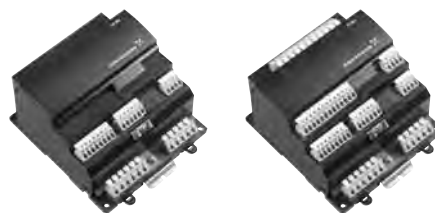


Fig. 8 IO 351A and IO 351B

TM 03 2110 - GrA0815

IO 351A

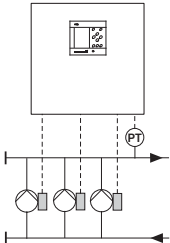
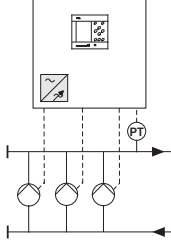
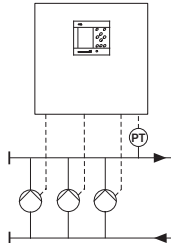
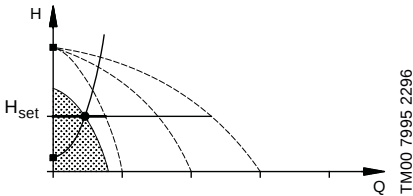
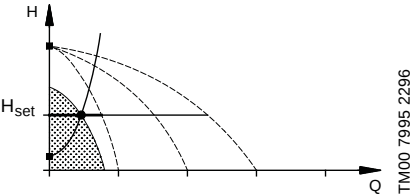
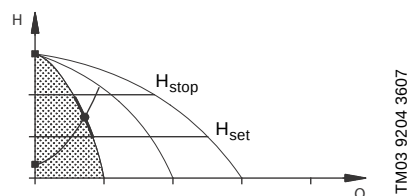
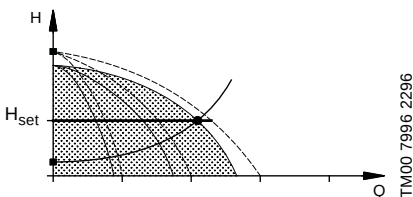
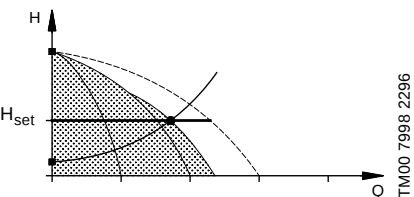
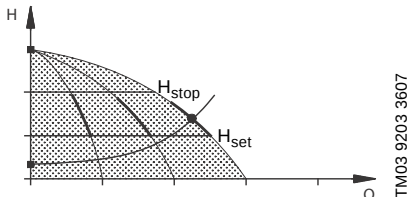
The IO 351A is used in systems with one to three mains-operated Grundfos pumps.

IO 351B

The IO 351B is used for one to six mains-operated Grundfos pumps and/or pumps controlled by external Grundfos CUE frequency converters. The module can also be used as an input-output module for communication with monitoring equipment or another external equipment.

Overview of control variants

The examples below are based on booster systems.

Systems with speed-controlled pumps	Systems with pumps connected to one Grundfos CUE frequency converter	Systems with mains-operated pumps
Control MPC-E/EC	Control MPC-F	Control MPC-S
Control MPC-E with three E-pumps. Control MPC-EC with three CUEs.	Control MPC with three pumps. One of the pumps is connected to a Grundfos CUE frequency converter in the control cabinet. The speed-controlled operation alternates between the pumps.	Control MPC with three mains-operated pumps.
 TM03 0993 0905	 TM03 1265 1505	 TM03 0999 0905
One E-pump in operation.	One pump connected to a Grundfos CUE frequency converter in operation.	One mains-operated pump in operation.
 TM00 7995 2296	 TM00 7995 2296	 TM03 9204 3607
Three E-pumps in operation.	One pump connected to a Grundfos CUE frequency converter and two mains-operated pumps in operation.	Three mains-operated pumps in operation.
 TM00 7996 2296	 TM00 7998 2296	 TM03 9203 3607
- Control MPC-E maintains a constant pressure through continuous adjustment of the speed of the pumps. - The performance is adjusted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation. - Pump changeover is automatic and depends on load, operating hours and fault. - All pumps in operation will run at equal speed. - The number of pumps in operation also depends on the energy consumption of the pumps. If only one pump is required, two pumps will be running at a lower speed if this results in a lower energy consumption. This requires that the differential pressure of the pump is measured.	- Control MPC-F maintains a constant pressure through continuous adjustment of the speed of the pump connected to the external Grundfos CUE frequency converter. - The speed-controlled operation alternates between the pumps. - One pump connected to the external Grundfos CUE frequency converter always starts first. If the pressure cannot be maintained by the pump, one or two mains-operated pumps will be cut in. - Pump changeover is automatic and depends on load, operating hours and fault.	- Control MPC-S maintains an almost constant pressure through cutting in/out the required number of pumps. - The operating range of the pumps will lie between H_{set} and H_{stop} (cut-out pressure). - Pump changeover is automatic and depends on load, operating hours and fault.

Control SPMP 204

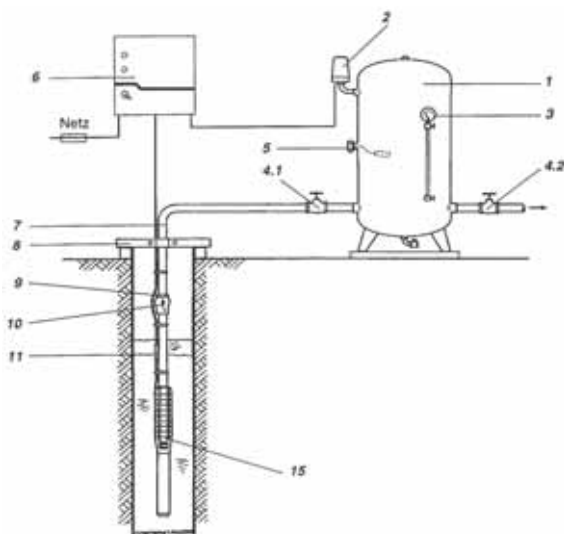


TM05 2058 4311

Fig. 9 Example of MP 204 panel

General description of the product

Installation layout



TM05 2059 4311

Fig. 10 Submersible application

Pos.	Description
1	Pressure tank
2	Pressure switch for pressure regulation
3	Pressure gauge
4.1	Isolating valve before the pressure tank
4.2	Isolating valve after the pressure tank
5	Aspirator
6	Control unit Control SPMP 204
7	Riser
8	Pipe clamp
9	Submersible drop cable
10	Ventilator with non-return valve
11	Cable coupling
15	Submersible pump

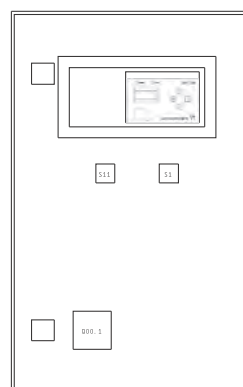
The installation layout shows exemplarily the configuration for pumping in a closed tank. Instead of a closed tank also an open tank can be used. In this case a level depending float switch will be mounted for demand depending control instead of the pressure switch. Furthermore a system configuration without a tank is also possible. Then the pressure switch will be installed directly into the supply line.

General construction

The Control SPMP 204 regulates the water supply by switching on and switching off a Grundfos SP pump when reaching a certain pressure in the installation. For this purpose an external pressure switch will be connected to the control.

The Control SPMP 204 is set from factory and checked before delivery. The control is placed in a control cabinet designed for wall-mounting. The operation is carried out by the control panel at the front of the control cabinet. The MP 204 being integrated in the control is set from factory to an average current value. The motor current must be adjusted during commissioning.

Front view



Interior view

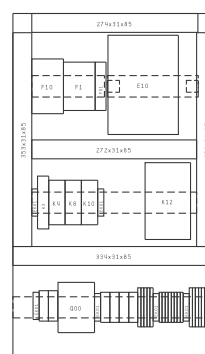
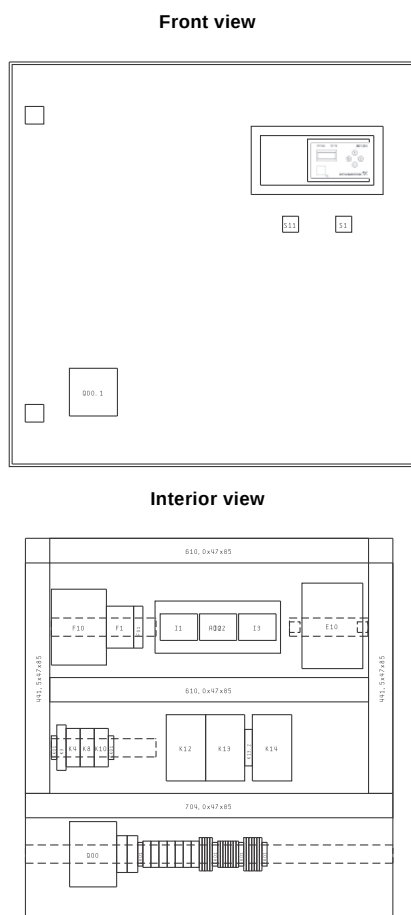


Fig. 11 Front and interior view (DOL version)

TM05 2060 4311

TM05 2061 4311



TM05 2062 4311

TM05 2323 4911

Fig. 12 Front and interior view (SD version)

Description of operating elements

See fig. 11 and 12.

S1	Reset button for manual resetting of common alarm
Q00	Main switch For connecting and disconnecting from the main the device is switched on and off by means of the main
S11	Selector switch (Manual - 0 - Auto) with built-in signal lamp Three operating modes can be selected: Position "0": Pump stopped, signal lamp is off. Position "Auto": Automatic switch-on and switch-off of the pump depending on the external pressure switch. Lamp is on when pump is running. Position "Hand": Manual operation by evasion of the external pressure switch 2, i.e. for test run. Lamp is on.
E10	Operator panel of the MP 204 The control elements are described in the instruction manual of the MP 204.

Description of the control cabinet components

F01	Fuse for the control voltage
F1	Fuse for the MP 204
F10	Fuse for the motor
I1 - I3	Transformer
K3	Relay for pump follow-up time
K4	Relay for common alarm
K8	Relay for water shortage/protection against dry running
K10	Relay for fault indication MP 204 (pump)
K12 - K14	Motor contactor

Functions of basic version

The basic version has the following functions described below.

Demand depending on/off control

By means of the pressure switch on the discharge side an automatic on/off control can be realised in connection with this control device (application see installation layout).

If the start pressure of the installation is fallen below the value being set at the pressure switch, the pump starts automatically via the pressure switch.

After reaching the stop pressure being set at the pressure switch, the pump stops automatically via the pressure switch.

If pumping into open tanks a level depending float switch or similar (potential-free) can be used alternatively.

To avoid swinging and to reduce the number of starts and stops, a pump follow-up time of 50 ms to 1 h can be set.

The monitoring of the motor is realised by the electronic motor protection device MP 204 (see wiring diagram).

Water shortage / protection against dry running

If the pressure (level) falls below the preset value (level), the pump stops.

When the required pressure (level) is reached again, the pump starts automatically.

Fault indication

A fault is indicated by the illuminated push button S1 (see wiring diagram).

If the fault has been removed, the fault indication can be reset by pushing the illuminated push button. Additionally the fault must be reset at the MP 204 by pushing the button "R".

Motor protection

The built-in electronic motor protection device MP 204 offers a complete motor protection (see instruction manual of MP 204).

Functions of MP 204

For programming/operation and fault finding see the instruction manual of the MP 204.

Type key

Example	Control UW - SPMP 204	1x	13.81 - 16.7A	DOL	3x400V	IP54
Type range						
Sub-group						
Number of pumps						
Motor current						
Starting method						
Supply voltage						
Enclosure class						

Technical data

Type designation:	Control SPMP 204
Number of pumps:	1
Cabinet/enclosure class:	Steel plate/IP54
Dimensions:	Depending on motor power (see wiring diagram)
Rated power:	0.06 - 132 kW per pump
Rated current:	DOL 0.22 - 245 A SD 0.22 - 245 A
Supply voltage:	3 x 400/230 V 50 Hz/ N/ PE
Ambient temperature:	0-40 °C
Motor protection:	MP 204

Inputs

1. On/off remote control
2. Min./max. pressure switch (1-pole transmitter)
3. Water shortage / protection against dry running (1-pole transmitter).

Outputs

Indications to a central line control station

1. Operation indication potential-free on terminals
2. Fault MP 204 on terminals
3. Common alarm potential-free on terminals.

Motor protection

DOL	3-120 A:	MP 204
	more than 120 A:	by external current transformer
SD	3-120 A:	0.22 - 245 A
	more than 120 A:	by external current transformer



Fig. 13 Inside view of MP 204 panel

TM05 2324 4911

Transport and storage

The controls are delivered ex factory in a suitable packaging made for transport with forklift trucks or similar.

Transportation is only allowed in the packaging intended for this task or in an equivalent packaging.

After delivery the controls must be stored so that no damages at the electric components can occur.

Storage temperature:

0-40 °C.

Relative air humidity:

Max. 95 %.

For the environment ...

Surely you might understand that a transport packaging is necessary. Please help us to protect our environment by disposing of the materials being used in accordance to the directives or by using them again. If required, please contact the INTERSEROH partner being responsible or the next Grundfos company.



Installation

Mechanical installation

The control device is designed only for indoor installation. It must not be exposed to direct sunlight and has to be sited in a dry, well ventilated but frost-free location.

Warning

Installation and operation in a potentially explosive environment is not allowed.

The control must be installed and connected in accordance with the local directives.

The installation must be carried out by a Grundfos technician or by qualified personnel.

To ensure a good accessibility to the control or their components, take care that there is sufficient place for the installation and that the control is mounted in a correct height. A sufficient air supply for cooling must also be ensured.

Mount the control cabinet with screws at the wall. The control should be placed near the pump. Therefore drill holes into the wall in accordance with the hole pattern on the rear panel of the control cabinet. For mounting use dowels and screws being dimensioned sufficiently.

Warning

During drilling the holes take care that no cables or water and gas pipes will be damaged. Furthermore ensure for a safety installation.



Electrical connection

The electrical connection is shown in the enclosed wiring diagram.

Warning

Prior any work check, if all requirements to the installation site are met and if the electrical data stated on the name plate correspond to the existing voltage supply.

The electrical connection has to be made only by qualified personnel in accordance with local directives.



- The AC power line must be fused at site in accordance to their cross section as described in VDE 0100. Then connect it to the main switch in the control cabinet (see wiring diagram). N and PE must be wired to terminal block X0.
- Connect the motor to terminal block X1 in the control cabinet (see wiring diagram). If the motor has a thermal sensor, it can also be connected to terminal block X1.
- Connect the external pressure switch to terminal block X10, terminals 6 and 7 in the control cabinet (see wiring diagram).

No external motor protection is required.

If the pump should switch on and off by external, remove the bridge at the terminal block X10, terminals 1 and 2 and connect the external switch.

For more information about the electrical connection see instruction manual of the MP 204.

Commissioning

Measures before initial commissioning

For the following work it is required that the Control SPMP 204 is already installed completely and the riser and the motor cable are firmly connected to the pump.

Prior commissioning of the installation check, if all connections with screwing terminals in the control cabinet and at the signal transmitters are tightened firmly.

Note

Warning

Settings must be done only by qualified personnel.

Do not touch any live parts, if the control cabinet is open. Avoid body contact with earthed metal parts (pipes, frames, etc.).



Prior commissioning the pump must be submerged completely into the liquid and the installation must be filled completely with the pumped liquid. See instruction manual of the pump.

Initial commissioning

For commissioning proceed as follows:

1. Set the pressure values at the external pressure switch (see instruction manual of the pressure switch).
2. Set the rated current of the motor at the MP 204 (see instruction manual of the MP 204).
3. Before switching-on the system open completely the isolating valve **4.1** at the suction side of the pump.
4. Turn the selector switch in position "Auto".
5. Slowly open completely the isolating valve after the pressure tank **4.2**.
6. Switch on the installation by means of the main switch.
7. Open the tap: the pump starts running.
8. Check the direction of rotation (see instruction manual of the pump).
9. Interchange two phases (before the MP 204), if necessary.
10. Close the tap: The pump stops.
11. Check the required on/off switch-points and adjust them at the external transmitter **2.1**, if necessary.

For more details about initial commissioning see instruction manual of the SP pump and the MP 204.

All other external transmitters must be set to the custom-designed values at site.

Operation

After installing and switching on the Control SPMP 204 according to the regulations, no more operation is required. The installation works automatically and switches demand depending on or off.

For manual operation, i.e. for a test run or for temporary switching on and off the pump during commissioning or service work, turn the selector switch in position "Hand" and push the button "ON" or "OFF". Therefore the main switch must be in position "I".



Warning

Ensure that the control is vented sufficiently.

If a float switch is used (during request), pay attention that no wash of the waves occurs within the tank, as this can result in frequent short-time switch-on and switch-off of the pump.

Note

By correct setting of the pump follow-up time (relay K3) a temporary switch-on and switch-off of the pump can be prevented.

Shutdown

To shut down the Control SPMP 204 proceed as follows:

1. Switch off the control by the main switch (see wiring diagram).
2. Turn the selector switch in position "0".
3. Remove external fuses (if any).
4. Close isolating valves at suction and discharge side.
5. Secure installation against unauthorised re-starting.

LC and LCD level controllers

Reliable level controllers from Grundfos

Grundfos offers a choice of level controllers to keep a watchful eye on liquid levels in pump pits, ensuring correct operation and protecting your pumps. The range includes the LC models, designed for single pumps, and the LCD models, designed for two pumps. They are all excellent for both drainage pumps and sewage pumps, making them ideal partners for the Grundfos KP, AP, SEG, S1, SV, SEN, SEV and SE1 pump series.



Fig. 14 LC(D) level controller with level sensors

Three series - six versions

The Grundfos LC/LCD range of level controllers comprises three series with a total of six versions:

- LC/LCD 107 level controllers, operated by level bells
- LC/LCD 108 level controllers, operated by float switches
- LC/LCD 110 level controllers, operated by electrodes

All of these models are designed specifically for Grundfos pump systems, ensuring a perfect match between the technologies used. They are excellent for applications requiring up to 11 kW direct-on-line start motors. The LC and LCD 108 can also be supplied with an integrated star-delta starter for applications requiring larger motors, up to 30 kW

Control panels and monitoring

All LC/LCD level controllers feature a control panel with a switch, enabling easy operation of one or two pumps in manual or automatic mode. The control panel is fitted in a cabinet that meets the requirements for enclosure class IP65.



Fig. 15 Setting of dip switches on CU 2XX

The flexible electronic control units (known as the CU 211/212/213/214, respectively) will handle all inputs and respond in accordance with the controller settings. The control unit features a 10-pole DIP switch which is used to specify the correct system responses to input - such as when to sound an alarm or when to have both pumps operate at the same time. The DIP switch makes it possible to quickly adapt the level.



Fig. 16 Front of LCD panel with CU 212

Modular system

A modular approach allows the Grundfos level controllers to be fitted with extra features such as an hour counter, start counter and/or battery backup to ensure that an alarm is sounded in the event of power failure, etc. All modules/accessories are easily installed to current circumstances.

It can also enable/disable automatic restart following thermal cut-outs where this is relevant.

Grundfos level controllers in brief

Listed below are some of the features and benefits of the Grundfos level controllers.

- control of one (LC) or two pumps (LCD)
- automatic alternation of operation (LCD)
- automatic test run (prevents shaft seals from becoming jammed in the event of long periods of inactivity)*
- water hammer protection
- battery back-up (available as optional accessory)
- starting delay after power supply failure (prevents network overload)*
- automatic alarm reset (if required)
- automatic restart (if required)
- adjustable stop delays of up to 180 seconds to suit operating conditions
- indication of liquid level
- high-level alarm
- motor overload protection relay
- protection against motor overheating via input to PTC resistor/thermal switch.

* Requires battery back-up.

Alarm protection

The Grundfos level controllers will warn you by giving an alarm in these cases

- overload
- dry running
- excessive temperatures
- incorrect phase sequences
- power cut-out
- failing level input
- mains supply failure (when fitted with the optional battery back-up)
- float switch/level bell/electrode failure.



TM05 2101 4411

Fig. 17 Front view of LC (D) panel



TM05 2099 4411

Fig. 18 Front view of LC (D) panel

LC 107

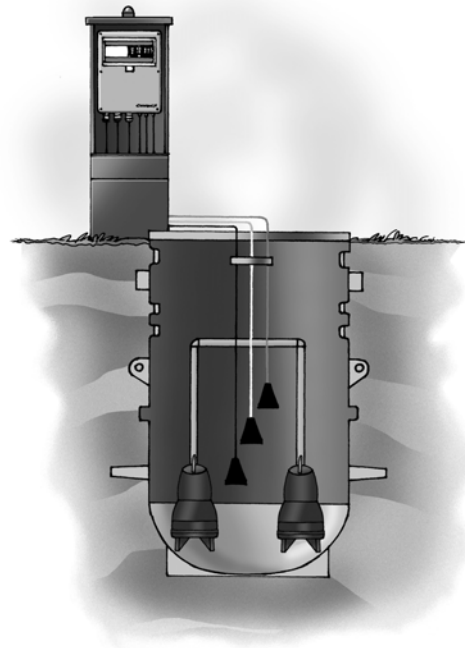
The Grundfos LC 107 level controller is designed for use with a single pump, using a pair of level bells to provide signal input to the control unit. The lower bell sends the input signal that starts the pump, while the upper bell triggers a high-level alarm if the liquid reaches it. It will also start the pump in emergencies if the lower bell should fail. The LC 107 allows users to set a specific operating time, using the DIP switch to specify how long the pump should continue operation after a start signal has been received.

LCD 107

The LCD 107 level controller is almost identical to the LC 107. The main difference is that the LCD 107 is designed as a two-pump controller using three level bells. The LCD 107 also ensures that the total operating hours are evenly distributed between the two pumps by means of an automatic alternation function. The lower bell sends the input signal that starts the first pump, and the middle bell sends the signal that starts the second pump in cases where simultaneous pump operation is required. The upper bell acts as a high-level alarm and will also start the pumps in emergencies where the lower bells fail.

How it works

Level bells offer a reliable way of monitoring liquid levels. With this solution, no electronic equipment is installed in the pump pit. Instead, the level bells are connected to pressure switches in the control box by means of tubes. As the liquid rises to a height of approximately three centimetres above the bottom of the level bell, the air inside the bell is compressed, activating the pressure switch in the control box. This sends a signal to either start the pump or give warning by means of the system alarms. The simplicity of the solution also has the added benefit of making level bells highly suitable for use in potentially explosive atmospheres.



TM05 2100 4411

Fig. 19 Application controlled with level bells

Design features

Grundfos level bells are made from cast iron. This makes them heavy enough to maintain the correct position in the pump pit. They are suitable for applications where the liquid pumped has a pH value of 4 to 10.

Controllers with float switches

The LC 108 and LCD 108 level controllers are supplied as complete units with a motor protection relay incorporated in the waterproof cabinet. These level controllers are based on on/off signals, allowing them to receive input from up to four float switches positioned in the pump pit. Float switches are sold separately.

Like the other level controllers from Grundfos, the LC and LCD 108 controllers can serve systems requiring up to 11 kW direct-on-line start motors. The 108 controllers are also available with an integrated star-delta starter for applications requiring up to 30 kW motors. Both versions have potential-free signal outputs for common alarms and high level alarm as NO and NC. A buzzer in the control unit also provides an audible alarm.



TM05 2101 4411

Fig. 20 Front view of LC (D) panel

LC 108

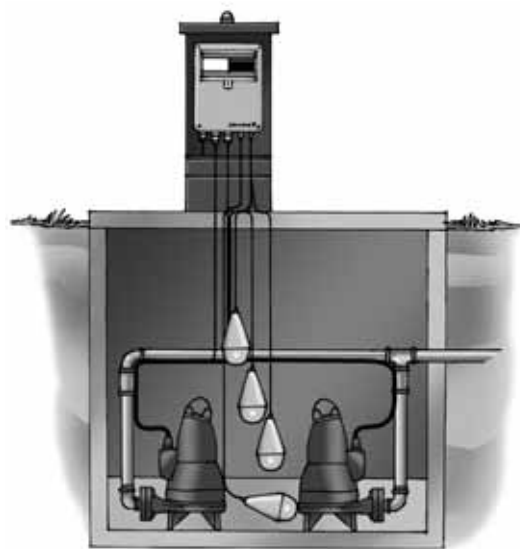
The LC 108 level controller is designed for use with a single pump, responding to signals from float switches. When only one float switch is used to start the pump, you must define the operating time following a stop signal by means of the DIP switches.

LCD 108

The LCD 108 level controller is designed to control two pumps on the basis of signals from float switches. The LCD 108 can be configured for systems allowing for simultaneous operation of the two pumps (using three or four float switches), as well as for systems with 100 percent spare capacity. The LCD 108 also has an automatic pump alternation function, ensuring that the total operating hours are evenly distributed between the two pumps.

How it works

A float switch is a very popular way of controlling liquid levels in tanks, pits, etc. A switch, encased in a polypropylene housing, is suspended at the desired height by its own 3-core cable. When the liquid reaches a certain level, the drop-shaped float switch tips over, causing the contact to open or close. This triggers the response determined by you.



TM05 2102 4411

Fig. 21 Application controlled with float switches

Design features

The Grundfos float switches are of the non-mercury type and are available for standard and explosion proof pumps. The hermetically sealed polypropylene housing and polyurethane cable makes the float switch resistant to e.g. many chemicals, alcohol, uric acid, sewage, oils, petrol and fruit acid.

Monitoring liquid levels with electrodes

The LC 110 and LCD 110 are supplied as complete level controllers contained within a waterproof cabinet. These level controllers respond to signals from electrodes (sold separately). As they work by means of electronic signals, the LC/LCD 110 can receive input from up to five electrodes located in a pump pit.



TM05 2103 4411

Fig. 22 Front view of LC (D) panel

LC 110

The LC 110 level controller is designed for level control, monitoring and protection of single pumps in wastewater, water supply and drainage systems. It can be configured with a basic start and stop function (three electrodes), with an added alarm function (four electrodes), or with added dry-running protection (five electrodes).

LCD 110

The LCD 110 level controller is designed for level control, monitoring and protection of pairs of pumps in wastewater, water supply and drainage systems. It can be configured with basic stop, start 1, and start 2 functions (four electrodes) or with additional alarm functions (five electrodes), for simultaneous operation of both pumps, and more. The LCD 110 also has an automatic pump alternation function, ensuring that the total operating hours are evenly distributed between the two pumps.

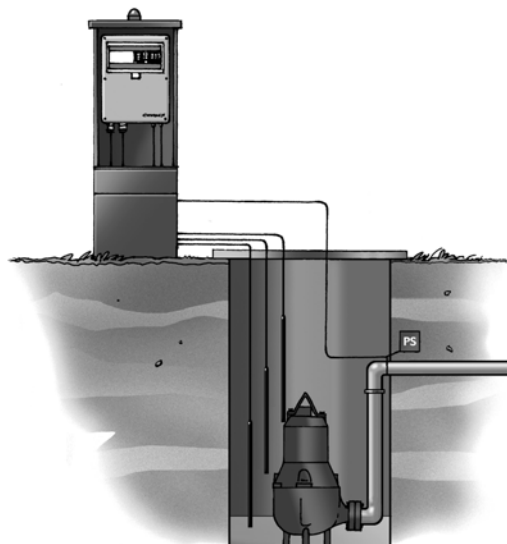
Design features

The electrodes are made of stainless steel (DIN 1.4401) with polyethylene insulation. They are set inside a nylon housing with an R 1 1/2 thread, and are delivered with 10 m cable as standard. The electrodes are sold separately and must be adjusted on-site to suit the application.

The excellent chemical and thermal properties of the electrodes allow them to be used in a wide range of applications. Electrodes are particularly recommended for narrow pits where larger alternatives may become stuck.

How it works

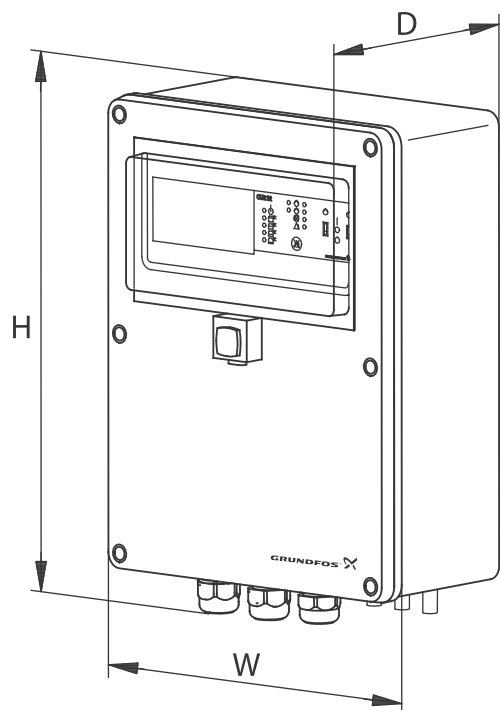
Electrodes offer a highly reliable solution to liquid level monitoring in pump pits, even where space is very limited. Electrodes are suspended at appropriate heights, triggering specific responses as the liquid reaches them. This operating principle requires a reference signal, which means that the controller is connected to a conductive material that touches the liquid. This is usually an electrode, but other materials can be used as well.



TM05 2104 4411

Fig. 23 Application controlled with electrodes

Dimensions and weights



TM05 2233 4611

Fig. 24 Dimensions on the LC (D) panel range

Controller type	Height [mm]	Width [mm]	Depth [mm]	Weight [kg]
LC 107	410	278	150	8
LCD 107	410	278	150	10
LC 108	410	278	150	6
LC 108 Y/D	590	380	200	12
LCD 108	410	278	150	7
LCD 108 Y/D	635	500	220	32-56
LC 110	410	278	150	6
LCD 110	410	278	150	7



TM05 2101 4411

Fig. 25 Front view of LC (D) panel

Type key

Example:		LC	107	230	1	12	30/150	DOL
Controller type	LC = One-pump controller							
	LCD = Two-pump controller							
Type of level sensors	107 = Control of 1 or 2 pumps based on signals from bell shaped level pickups (pneumatic) Max. 11 kW shaft power DOL							
	108 = Control of 1 or 2 pumps based on signals from float switches or electrodes Max. 11 kW shaft power DOL Max. 30 kW shaft power SD							
	110 = Control of 1 or 2 pumps based on signals from electrodes Max. 11 kW shaft power DOL							
Voltage [V]								
Number of phases	1							
	3							
Maximum operating current per pump [A]								
Operating / starting capacitor [mF]								
[] = without capacitor								
30 = operating capacitor								
30/150 = 30 mF operating and 150 mF starting capacitor								
Starting method	DOL = Direct on-line starting							
	SD = Star-delta starting (only LC 108 and LCD 108)							

CU 100

General description

The control box CU 100 is designed for the control of small pumps.

The CU 100 is incorporated in an IP54 plastic cabinet and has screwed metric cable entries.

The control box is available in several variants which can be used for the following:

- single-phase pumps or
 - three-phase pumps
- and
- start/stop by means of a float switch or
 - manual start/stop.

Single-phase control boxes are supplied with capacitors and with or without float switch.

Three-phase control boxes are supplied with a float switch.



Fig. 26 CU 100 control box

Applications

The control box CU 100 is designed for the starting, operation and protection of small pumps.

- Single-phase: up to 9 amps.
- Three-phase: up to 5 amps.

See *Technical data* on page 34.

Type key

Example	CU	100	230	1	9	30/150	A
Type range							
Type designation							
Voltage:							
230 = 230 [V]							
400 = 400 [V]							
Number of phases:							
Maximum amp. consumption for the pump [A]							
Run/starting capacitor [μF]							
A = with float switch							
[] = without float switch							

Functions

The control boxes CU 100 incorporate:

- an on/off switch (I/O),
- a contactor which is cut in and out by the float switch (if installed) and/or
- a man/auto switch in the cabinet front as well as
- capacitors for single-phase variants.

During manual operation, the pump is started and stopped by means of the man/auto switch or the thermal relay.

Single-phase variants

The thermal relay must be reset manually with the button in the cabinet front.

Three-phase variants

The motor starter is automatically reset.

During automatic operation, the float switch will start and stop the pump.

See the functional block diagram below.

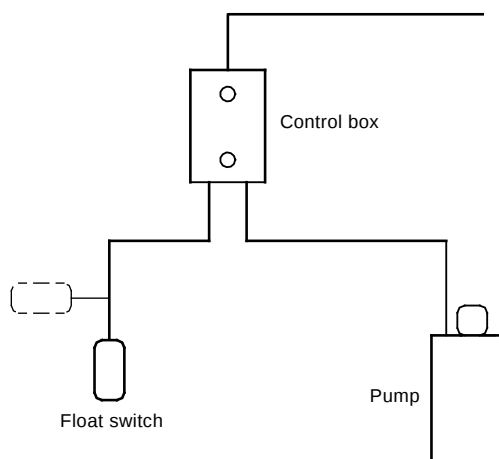


Fig. 27 Functional block diagram

Construction

External construction:

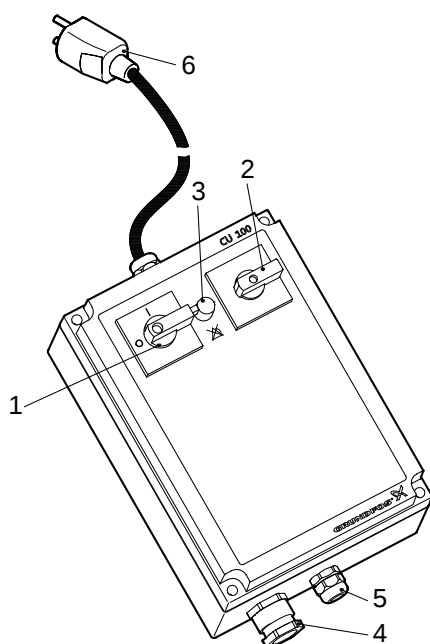


Fig. 28 Single-phase

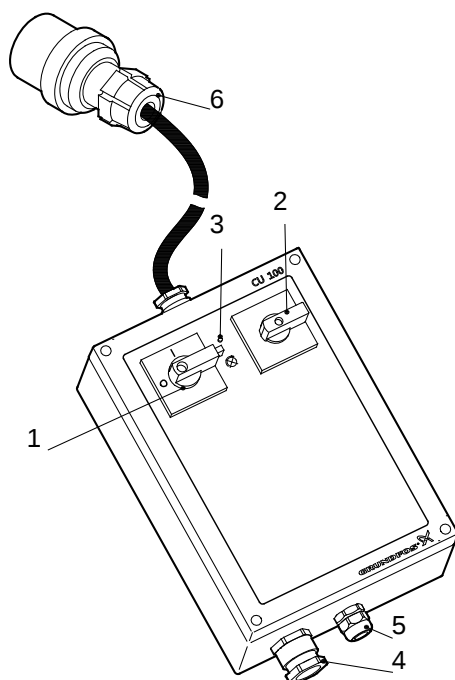


Fig. 29 Three-phase

The position numbers in the table refer to figs. 28 and 29.

Pos.	Description
1	On/off switch, lockable
2	Man/auto switch
3	Single-phase: Resetting of thermal relay (X) Three-phase: Phase sequence indicator (X)
4	Connection of pump
5	Connection of float switch (model A only)
6	Mains connecting cable (3 metres): Single-phase: with Schuko plug Three-phase: with CE plug

Internal construction:

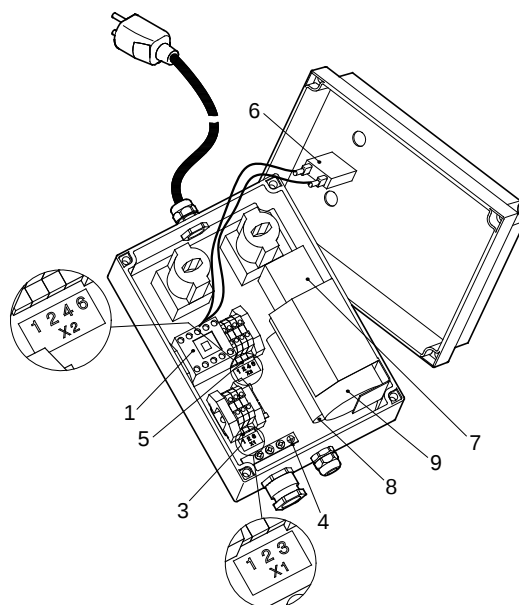


Fig. 30 Single-phase

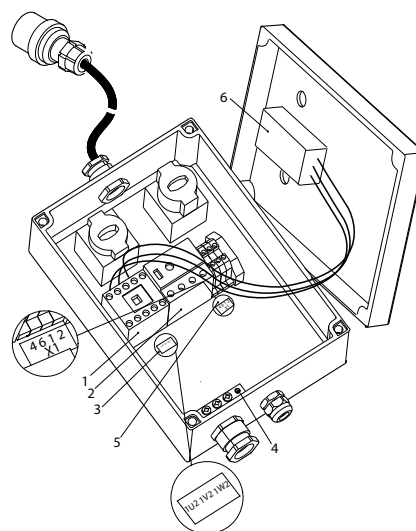


Fig. 31 Three-phase

The position numbers in the table refer to figs. 30 and 31.

Pos.	Description
1	Starter relay
2	Motor protection: Single-phase: Manual resetting, in the cabinet front Three-phase: Automatic resetting
3	Terminal block [X1] for connection of pump. Single-phase: Leads marked 1, 2 and 3 [1, 2 and 3] Three-phase: Leads marked 1, 2 and 3 [1, 2 and 3]
4	Earth bar, lead marked greenish yellow [⊕]
5	Terminals for the connection of: thermal switch(es)*: Leads marked 4, 5 and 6 [4 and 6] and float switch**: Leads marked brown and black [1 and 2].
6	Single-phase: Thermal relay Three-phase: Phase sequence indicator
7	Single-phase: Capacitor contact
8	Single-phase: Run capacitor
9	Single-phase: Starting capacitor

The lead markings in [] refer to SEG, SE1, SEV, DP and EF pumps from Grundfos.

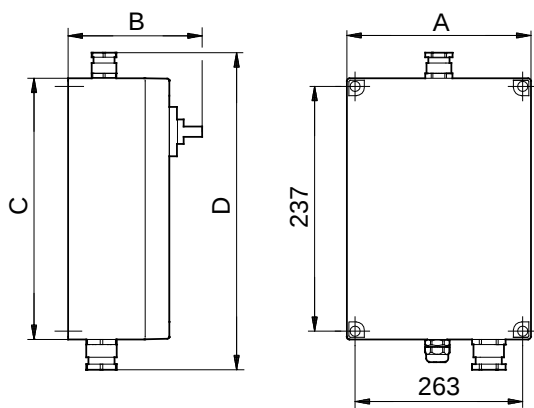
- * If the pump has more than one thermal switch, the switches must be connected in series so that the lowest switch stops the pump and the highest one is in reserve.
- ** The float switch is supplied with the control box and must be connected to the brown and black leads (NO contact).

Installation

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations. Before making any connections in the CU 100 or work on pumps, pits, etc., it must be ensured that the electricity supply has been switched off and that it cannot be accidentally switched on.

The control box CU 100 must not be installed and used for pumps installed in potentially explosive environments.

- Check that the control box is suitable for the local conditions, i.e. pump (current, voltage, etc.).
- Remove transport protectors, if any, from inside the cabinet.
- Remove the cabinet front and mount the control box on a plane surface with four screws through the mounting holes in the back plate of the cabinet. See fig. 32. The cable entries for the pump and the float switch must pointing downwards.



TM02 6072 5002

Fig. 32 Dimensions on the CU 100 box

Pos.	Three-phase and single-phase with start and run capacitor	Single-phase with run capacitor
A	180	180
B	155	133
C	253	253
D	305	305

Wiring diagrams

The table refers to the wiring diagrams below.

Control box	Figure
CU 100.230.1.9.30	33
CU 100.230.1.9.30.A	34
CU 100.230.1.9.30/150	35
CU 100.230.1.9.30/150.A	36
CU 100.230.3.5.A	37
CU 100.230.3.12.A	
CU 100.400.3.5.A	38

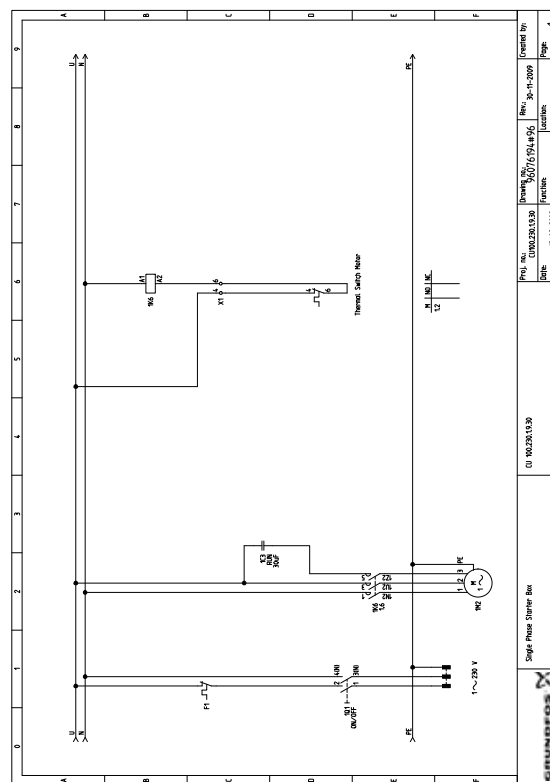
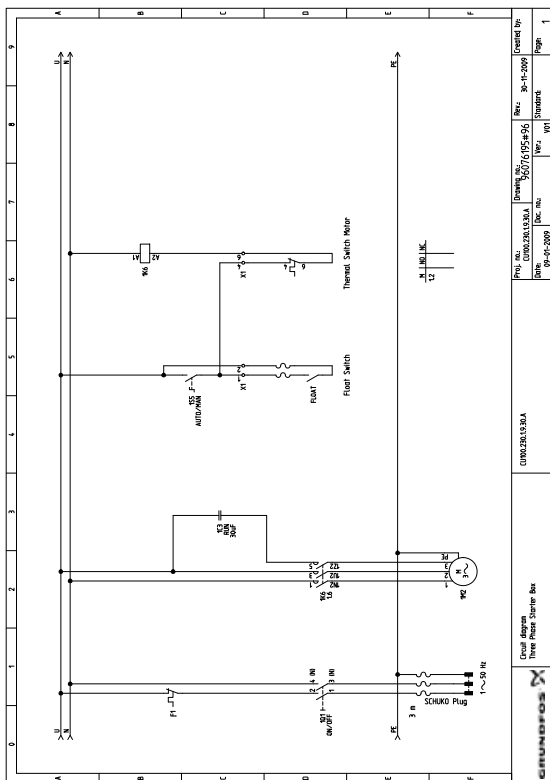
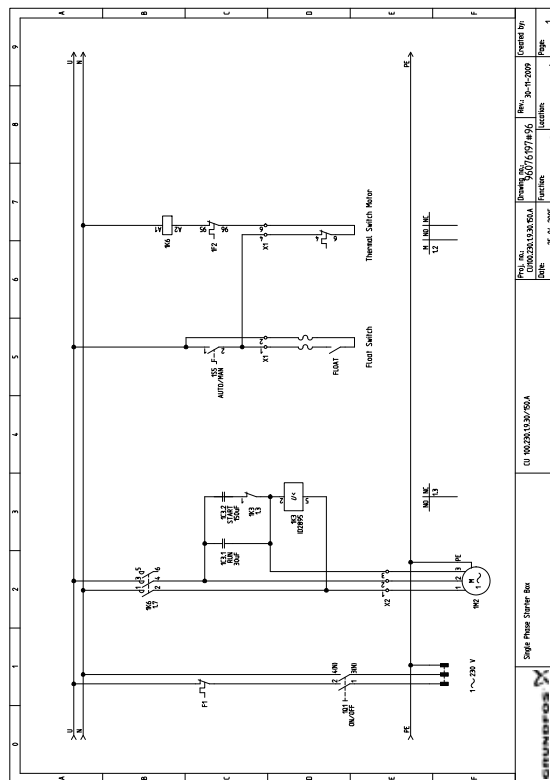


Fig. 33 CU 100.230.1.9.30

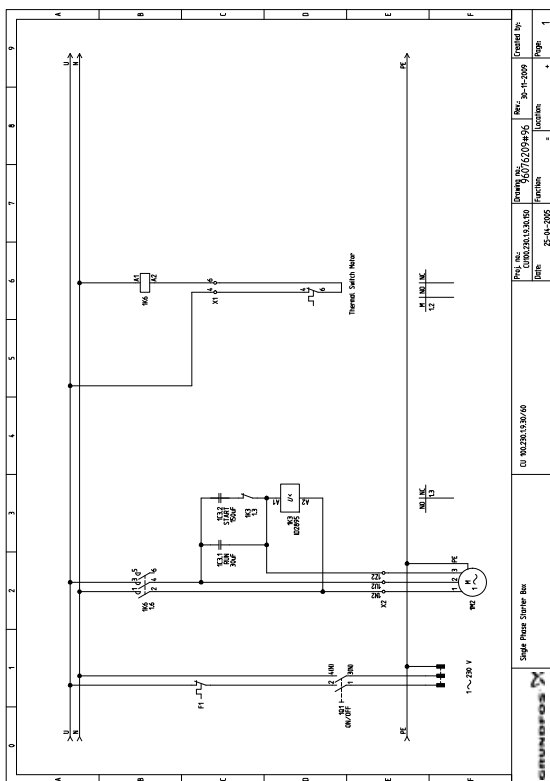
TM04 3943 1209



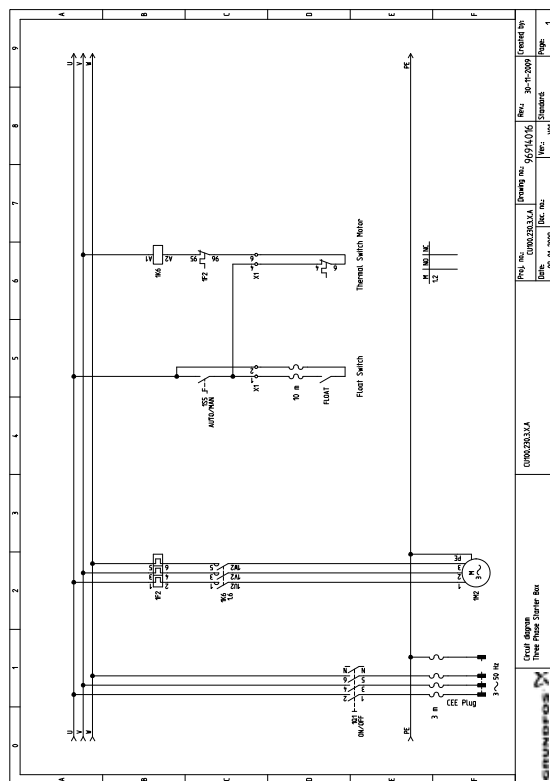
TM04 3940 1209



TM04 3938 1209



TM04 3939 1209



TM04 3942 1209

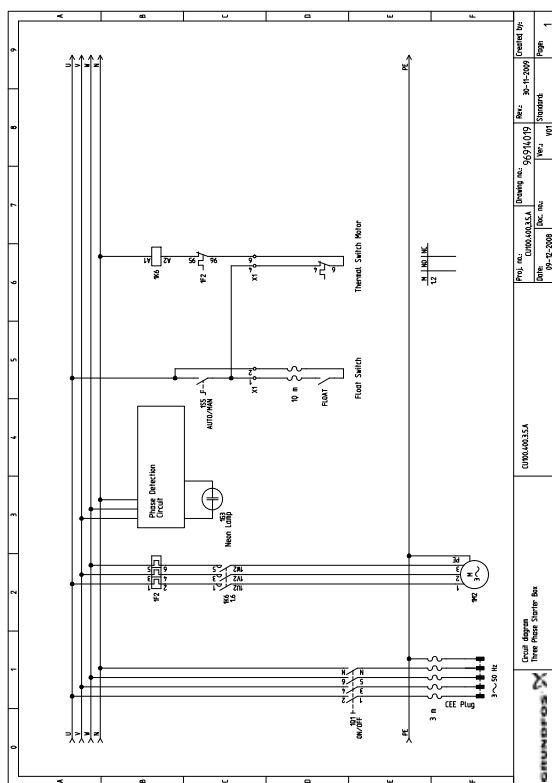


Fig. 38 CU 100.400.3.5.A

TM04 3941 1209

Technical data

Voltage variants, rated voltages

- 1 x 230 V, 50 Hz.
- 3 x 230 V, 50 Hz.
- 3 x 400 V, 50 Hz.

Voltage tolerances

-15 %/+10 %.

See the voltage tolerance stated in the installation and operating instructions for the pump.

Back-up fuse

Depending on variant. See nameplate.

Ambient temperature

- During operation: -30 °C to +50 °C.
- In stock: -30 °C to +60 °C.

Enclosure class

IP54.

EMC (electromagnetic compatibility)

According to EN 61000-6-2 and EN 61000-6-3.

Weight

Approx. 4 kg. Depending on variant. See nameplate.

Maintenance

During normal operation, the control box CU 100 is maintenance-free.

It is advisable to carry out periodic checks of the control box and the installation, i.e. cable entries, cables, float switch, gasket of the cabinet front and the pump. In particularly aggressive environments, it is advisable to check the contact in the control box.

Before starting any work on pumps used to pump liquids which could be constituted as being hazardous to health, thorough cleaning/venting of pumps, pits, etc. must be carried out according to local regulations.

Before making any connections in the CU 100 or work on pumps, pits, etc., make sure that the power supply has been switched off and that it cannot be accidentally switched on.

The control box CU 100 must not be installed and used for pumps installed in potentially explosive environments.

3. Protection and drives

Frequency drive, CUE

Grundfos CUE

The CUE is a series of frequency converters designed for speed control of a wide range of Grundfos pumps.

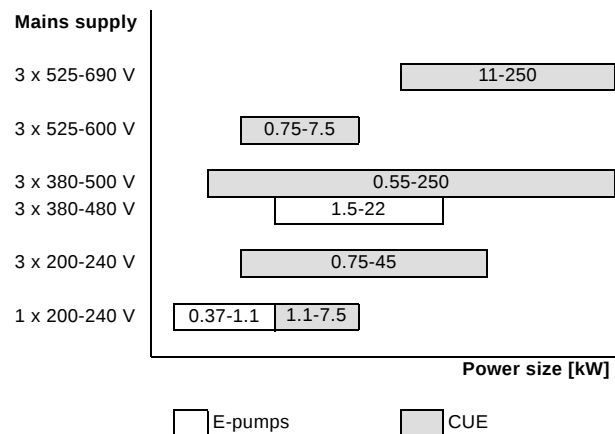


GrA4409

Fig. 39 Grundfos CUE solution

Built-in E-pump functionality

The CUE solution contains the same control functionality as the Grundfos E-pumps and is thus a supplement to the E-pump range. See the table below.



Designed for Grundfos pumps

The CUE can be used in both new and existing installations, but the pump and motor should be suitable for use with frequency converters.

The CUE is designed for the Grundfos pump types below.

Pump type
AFG
AMD
AMG
BM, BMB
BME, BMET, BMEX
BMP
CH, CHI, CHN, CHV
CHIU
CM
Contra
CPH, CPV
CR, CRI, CRN, CRT
CRK
CV
DP, EF
durietta
Euro HYGIA
F&B HYGIA
HS
LC, LF
MAXA, MAXANA
MTA, MTH, MTR
MTB
NB, NK
NBG, NKG
RC
S
SE, SEN, SEV
SP, SP-G, SP-NE
SPK
SRP
TP
VL

Further technical documentation

- Installation and operating instructions, 0.55-90 kW, contain all information for putting the CUE into operation.
- Installation and operating instructions, 110-250 kW, contain all information for putting the CUE into operation.
- Installation and operating instructions for the MCB 114 sensor input module contain all information for installation of the MCB 114.

Technical documentation is available on www.grundfos.com > International website > WebCAPS.

If you have any questions, please contact the nearest Grundfos company or service workshop.

User interface

The user interface offers these possibilities:

- Local operation via a control panel with graphic display where the menu structure is based on the well-known system from Grundfos E-pumps.
- Remote operation via external signals, for instance via digital inputs or GENIbus.
- Monitoring of operating status via indicator lights and signal relays.
- Display of alarm or warning and logging of the last five alarms and warnings.

Functions

Control modes for centrifugal pumps

The CUE has a wide range of pump-specific functions:

- Open loop:
The speed is kept at a set value in the range of min. and max. speed.
- Proportional differential pressure:
The differential pressure is reduced at a falling flow rate and increased at a rising flow rate.
- Constant differential pressure:
The differential pressure is kept constant, independently of the flow rate.
- Constant pressure:
The pressure is kept constant, independently of the flow rate.
- Constant level:
The liquid level is kept constant, independently of the flow rate.
- Constant flow rate:
The flow rate is kept constant, independently of the head.
- Constant temperature:
The liquid temperature is kept constant, independently of the flow rate.
- Constant other value:
Any other value is kept constant.

Start-up guide

The CUE has a start-up guide, which is started at the first start-up. Here a number of parameters is set automatically on basis of the pump type. Other parameters are set manually on basis of the data on the motor and pump nameplates. The start-up guide can be repeated, if necessary.

Thanks to the start-up guide, the installer can quickly set central parameters and put the CUE into operation.

Direction of rotation test

During the start-up guide, the CUE automatically tests and sets the correct direction of rotation without changing the cable connections if a pressure/flow sensor is connected. The direction of rotation test is performed manually if no sensor is connected.

Duty/standby

The duty/standby function is used to alternate between two pumps. Each pump is connected to a CUE unit. The primary task is to start the standby pump if the duty pump is stopped due to an alarm and to alternate the two pumps at least every 24 hours.

Duty/standby operation increases the security of supply and ensures that the standby pump does not get stuck.

Dry-running protection

To protect the pump, select the dry-running function together with an external sensor so that lack of inlet pressure or water shortage can be detected.

Low-flow stop function

In control mode constant pressure or constant level, the stop function is used for changing between on/off operation at low flow rate and continuous operation at high flow rate.

The low-flow stop function protects the pump and saves energy.

Monitoring of lubrication of motor bearings

When the bearing monitoring function is active, a warning will appear in the display when the motor bearings are to be lubricated or replaced.

Furthermore, the function gives an estimated time to service.

This improves motor maintenance.

Inputs and outputs

The CUE is equipped with a number of inputs and outputs:

- 1 RS-485 GENIbus connection
- 1 analog input, 0-10 V, 0/4-20 mA
- external setpoint
- 1 analog input, 0/4-20 mA
- sensor input, feedback sensor
- 1 analog output, 0-20 mA
- 4 digital inputs
- start/stop and 3 programmable inputs
- 2 signal relays (C/NO/NC)
- programmable.

Standards

The CUE is designed according to the following directives and standards:

- EMC Directive 2004/108/EC
- Low Voltage Directive 2006/95/EC
- EN 61800-5-1:2003/IEC 61800-5-1:2003
- EN 61800-3:2005/IEC 61800-3:2004/IEC 60034-11
- EN 6034-12/IEC 60034-12/IEC 60038/IEC 62114
- EN 50102
- EN ISO 2409
- EN ISO 3743-1
- EN ISO 4871
- EN ISO 11203
- DIN 44082.

Accessories

Grundfos offers a number of accessories for the CUE.

MCB 114 sensor input module

The MCB 114 is an option offering additional analog inputs for the CUE:

- 1 analog input, 0/4-20 mA
- 2 inputs for Pt100/Pt1000 temperature sensors.

Output filters

Output filters are used primarily for protecting the motor against overvoltage and increased operating temperature. However, output filters can also be used for reduction of acoustic motor noise.

Grundfos provides two types of output filter as accessories for the CUE:

- dU/dt filters
- sine-wave filters.

Floor-mounting option

The CUE is default installed on the wall. The enclosures D1 and D2 can also be installed on the floor on a pedestal designed for that purpose.

IP21/NEMA1 option

An IP20 enclosure can be upgraded to IP21/NEMA1 by using the IP21/NEMA1 option. The power terminals (mains and motor) will be covered.

Nameplate

The CUE can be identified by means of the nameplate. An example is shown below.



TM04 1759 2209

Fig. 40 Example of nameplate

Text	Description
T/C:	CUE (product name) 202P132... (internal code)
Prod.no:	Product number: 96754460
S/N:	Serial number: 123456G358 The first six digits are the serial number of the unit. The letter G is the code for production site. The last three digits indicate the production date: 35 is the week, and 8 is the year 2008.
0.75 kW	Typical shaft power on the motor
IN:	Supply voltage, frequency and maximum input current
OUT:	Motor voltage, frequency and maximum output current. The maximum output frequency usually depends on the pump type.
CHASSIS/IP20	Enclosure class
Tamb.	Maximum ambient temperature

Overview

The CUE is a multipurpose frequency converter suitable for a variety of applications demanding reliable and cost-efficient pump operation.

The CUE is used in five main fields of application:

Water supply and pressure boosting

Besides general water supply in municipal and industrial waterworks, the CUE is used for these specific applications:

- water supply
- pressure boosting
- washing.

The typical control modes are constant pressure, constant flow rate. Stop functions are used to stop the pump when the water flow is low.

Heating and air-conditioning

Liquid transfer in:

- heating applications
- cooling and air-conditioning applications.

The typical control modes are proportional pressure or constant temperature.

Process and sanitary applications

Liquid transfer in:

- breweries and dairies
- pure-water applications
- process applications
- purification applications.

The CUE is typically controlled by an external controller. The typical control mode is open loop.

Groundwater

Typical applications:

- groundwater supply to waterworks
- irrigation in horticulture and agriculture
- dewatering.

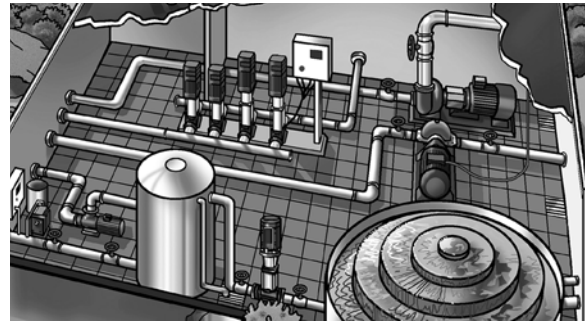
The typical control modes are constant pressure, constant flow rate or constant level control.

Wastewater

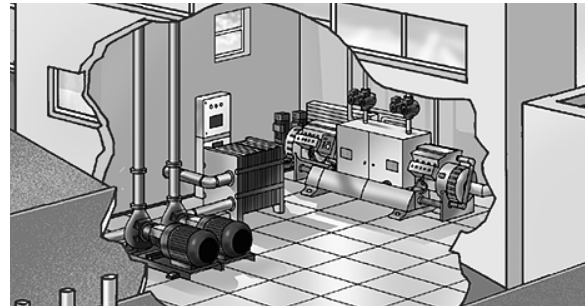
Transfer of:

- wastewater
- effluent
- drainage water
- process water.

The typical control mode is constant level function (emptying function).



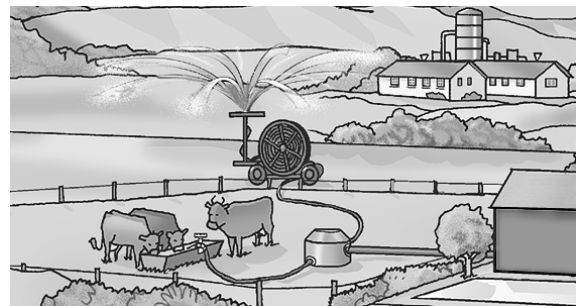
TM03 0146 4204



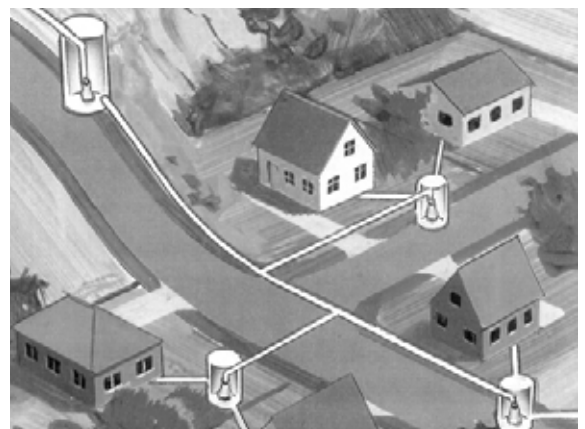
TM03 0147 4204



TM03 0148 4204



TM03 0149 4204



TM04 0223 5107

Overview

The CUE cabinet sizes are characterised by their enclosures. The table shows the relation between power size (P2), mains supply (V) and enclosure class (IP). It shows the complete range of the CUE.

Typical shaft power P2		Mains supply and enclosure class													
		1 x 200-240 V			3 x 200-240 V		3 x 380-500 V				3 x 525-600 V		3 x 525-690 V		
[kW]	[HP]	IP20	IP21	IP55	IP20	IP55	IP20	IP21	IP54	IP55	IP20	IP55	IP21	IP54	IP55
0.55	0.75						•			•					
0.75	1				•	•	•			•	•	•			
1.1	1.5	•		•	•	•	•			•	•	•			
1.5	2		•	•	•	•	•			•	•	•			
2.2	3		•	•	•	•	•			•	•	•			
3	4		•	•	•	•	•			•	•	•			
3.7	5		•	•	•	•									
4	5						•			•	•	•			
5.5	7.5		•	•	•	•	•			•	•	•			
7.5	10		•	•	•	•	•			•	•	•			
11	15				•	•	•			•			•		•
15	20				•	•	•			•			•		•
18.5	25				•	•	•			•			•		•
22	30				•	•	•			•			•		•
30	40				•	•	•			•			•		•
37	50				•	•	•			•			•		•
45	60				•	•	•			•			•		•
55	75						•			•			•		•
75	100						•			•			•		•
90	125						•			•			•		•
110	150							•	•				•	•	
132	200							•	•				•	•	
160	250							•	•				•	•	
200	300							•	•				•	•	
250	350							•	•				•	•	

Overview

The table below shows the functions offered by the CUE.

CUE functions	Setting or reading via:		
	CUE	GENIbus	PC Tool*
Operating modes, see page 42			
Normal	●	○	□
Stop	●	○	□
Min.	●	○	□
Max.	●	○	□
Control modes, see page 43			
Open loop	●	○	□
Proportional differential pressure	●	○	□
Constant differential pressure	●	○	□
Constant pressure	●	○	□
Constant pressure with stop function	●	○	□
Constant level	●	○	□
Constant level with stop function	●	○	□
Constant flow rate	●	○	□
Constant temperature	●	○	□
Constant other value	●	○	□
Setpoints, see page 46			
Setpoint, CUE menu	●		
External setpoint	●	○	□
GENIbus setpoint		○	
Predefined setpoints from digital inputs			□
Additional functions, see page 49			
Setting the direction of rotation	●		□
Status information	●		□
Logging information	●		□
PID controller	●	○	□
Stop functions	●		□
Dry-running protection	●		□
Duty/standby	●		□
Operating range	●	○	□
Motor bearing monitoring	●	○	□
Standstill heating	●	○	□
Ramps	●		□
Proportional differential pressure, parabolic			□
Hmax update			□
Differential pressure from two sensors			□
Start delay after power-up			□
Auto/manual restart after alarm		○	□
Limit exceeded		○	□
Copy of settings	●		
Pipe fill		○	□

CUE functions	Setting or reading via:		
	CUE	GENIbus	PC Tool*
Digital inputs, see page 56			
Start/stop	●		□
Min. (Min. curve)	●		□
Max. (Max. curve)	●		□
External fault	●		□
Flow switch	●		□
Alarm reset	●		□
Dry running (from external sensor)	●		□
Accumulated flow (from pulse flow sensor)	●		□
Additional set of ramps, ramp selector			□
Predefined setpoints from digital input			□
Signal relays, see page 57			
Ready	●		□
Warning	●		□
Alarm	●		□
Operation	●		□
Pump running	●		□
Lubricate	●		□
External relay control			□
Limit exceeded			□
Analog inputs, see page 57			
External setpoint	●		□
Sensor 1	●		□
Analog output, see page 57			
Feedback value			□
Speed			□
Frequency			□
Motor current			□
External setpoint input			□
Limit exceeded			□
MCB 114 sensor input module, see page 58			
Sensor input 2	●		□
Temperature sensor 1	●		□
Temperature sensor 2	●		□

- Default
- Optional with GENIbus
- Optional with PC Tool

* The PC Tool is a software program for connection of your computer to the CUE.

Operating modes

These operating modes can be selected with the CUE:

- Normal
- Stop
- Min.
- Max.

The operating modes can be set without changing the setpoint setting.

Normal

The pump operates in the control mode selected.
See page 43.

The control modes are different ways of controlling the pump speed when the operating mode is set to "Normal".

Stop

The pump has been stopped by user.

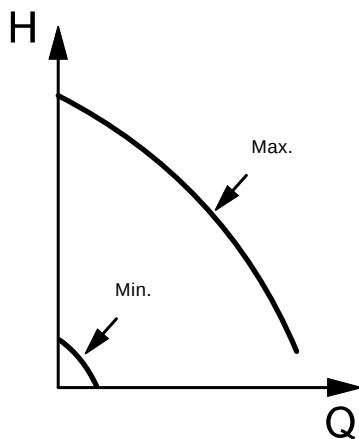
Min. curve

The pump is running at a set value for minimum speed.
See fig. 41.

This operating mode can for instance be used in periods with a very small flow requirement.

Max. curve

The pump is running at a set value for maximum speed.
See fig. 41.



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Fig. 41 Min. and max. curves

Control modes

The CUE has a built-in PID controller that provides closed-loop control of the value you want to control.

The CUE can also be set to open-loop control where the setpoint represents the desired pump speed.

Open loop is typically used without sensor. All other control modes require a sensor.

The table below shows the functions and possible settings offered by the CUE.

Pump type	Open loop	Proportional differential pressure	Constant differential pressure	Constant pressure	Constant level	Constant flow rate	Constant temperature	Constant other value
AFG	•				•	•		•
AMD	•				•	•		•
AMG	•				•	•		•
BM, BMB	•			•	•	•		•
BME, BMET, BMEX	•			•	•	•		•
BMP	•	•	•	•		•		•
CH, CHI, CHN, CHV	•			•	•	•	•	•
CHIU	•			•	•	•	•	•
CM		•	•	•	•	•	•	•
Contra	•			•	•	•	•	•
CPH, CPV	•			•	•	•	•	•
CR, CRI, CRN, CRT	•			•	•	•	•	•
CRK	•			•	•	•	•	•
CV	•			•	•	•	•	•
DP, EF	•			•	•	•		•
durietta	•			•	•	•	•	•
Euro HYGIA	•			•	•	•	•	•
F&B HYGIA	•			•	•	•	•	•
HS	•		•	•		•	•	•
LC, LF	•		•	•		•	•	•
MAXA, MAXANA	•		•	•	•	•	•	•
MTA, MTH, MTR	•			•	•	•	•	•
MTB	•			•	•	•	•	•
NB, NK	•		•	•	•	•	•	•
NBG, NKG	•		•	•	•	•	•	•
RC	•	•	•	•		•	•	•
S	•			•	•	•		•
SE, SEN, SEV	•			•	•	•		•
SP, SP-G, SP-NE	•			•	•	•	•	•
SPK	•			•	•	•	•	•
SRP	•				•	•		•
TP	•	•	•	•	•	•	•	•
VL	•			•		•	•	•
Other	•	•	•	•	•	•	•	•

See further description on the next pages.

Open loop, constant curve

The speed is kept at a set value in the range between the min. and max. curves. See fig. 42.

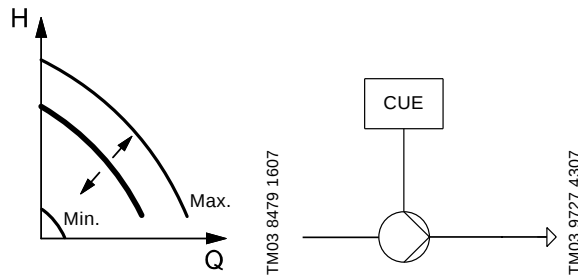


Fig. 42 Open loop, constant curve

In control mode "Open loop", the setpoint is set in % of the nominal speed. The setting range will lie between the min. and max. curves.

Operation on constant curve can for instance be used for pumps with no sensor connected.

This control mode is also typically used in connection with an overall control system such as Control MPC or another external controller.

Proportional differential pressure

The differential pressure of the pump is reduced at falling flow rate and increased at rising flow rate. See fig. 43.

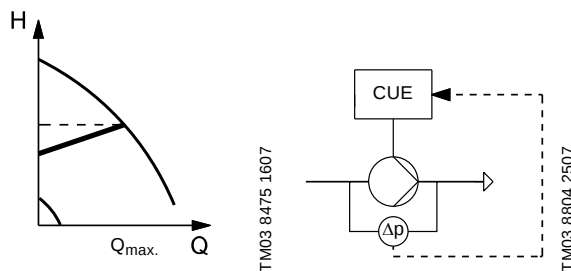


Fig. 43 Proportional differential pressure

The pump is controlled according to a differential pressure measured across the pump. This means that the pump system offers a proportional differential pressure in the Q-range of 0 to $Q_{max.}$, represented by the sloping line in the QH diagram.

Constant differential pressure, pump

The differential pressure of the pump is kept constant, independently of the flow rate. See fig. 44.

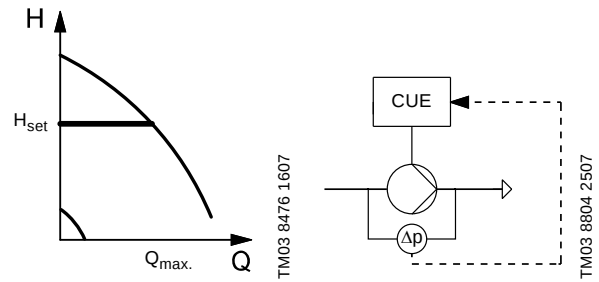


Fig. 44 Constant differential pressure, pump

The pump is controlled according to a constant differential pressure measured across the pump. This means that the pump system offers constant differential pressure in the Q-range of 0 to $Q_{max.}$, represented by the horizontal line in the QH diagram.

Constant differential pressure, system

The differential pressure of the system is kept constant, independently of the flow rate. See fig. 45.

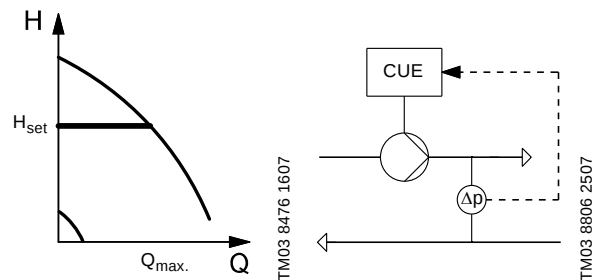


Fig. 45 Constant differential pressure, system

The pump is controlled according to a constant differential pressure measured across the system. This means that the pump offers constant differential pressure of the system in the Q-range of 0 to $Q_{max.}$, represented by the horizontal line in the QH diagram.

Constant pressure

The outlet pressure is kept constant, independently of the flow rate. See fig. 46.

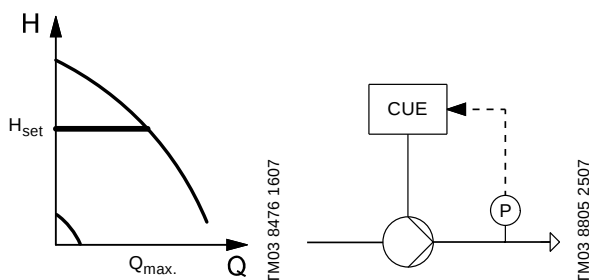


Fig. 46 Constant pressure

The pump is controlled according to a constant pressure measured after the pump. This means that the pump offers a constant pressure in the Q-range of 0 to $Q_{max.}$, represented by the horizontal line in the QH diagram.

Constant pressure with stop function

The outlet pressure is kept constant at high flow rate ($Q > Q_{min.}$). On/off operation at low flow rate. See fig. 47.

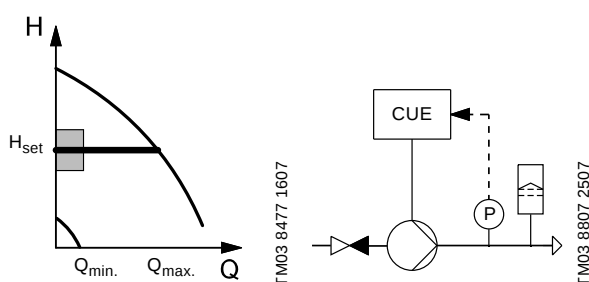


Fig. 47 Constant pressure with stop function

The pump is controlled according to a constant pressure measured after the pump. This means that the pump offers a constant pressure in the Q-range of $Q_{min.}$ to $Q_{max.}$, represented by the horizontal line in the QH diagram.

Constant level

The liquid level is kept constant, independently of the flow rate. See fig. 48.

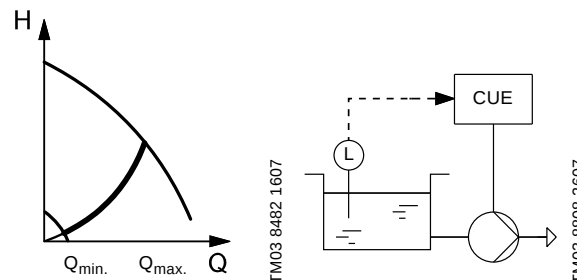


Fig. 48 Constant level

The pump is controlled according to a constant liquid level. This means that the pump offers a constant level in the Q-range of $Q_{min.}$ to $Q_{max.}$, represented by the parable line in the QH diagram.

The function is default an emptying function.

Constant level with stop function

The liquid level is kept constant at high flow rate. On/off operation at low flow rate. See fig. 49.

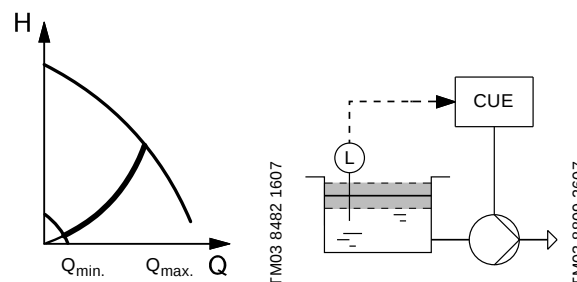


Fig. 49 Constant level with stop function

The pump is controlled according to a constant liquid level. This means that the pump offers a constant level in the Q-range of $Q_{min.}$ to $Q_{max.}$, represented by the parable line in the QH diagram.

The function is default an emptying function.

Constant flow rate

The flow rate is kept constant, independently of the head. See fig. 50.

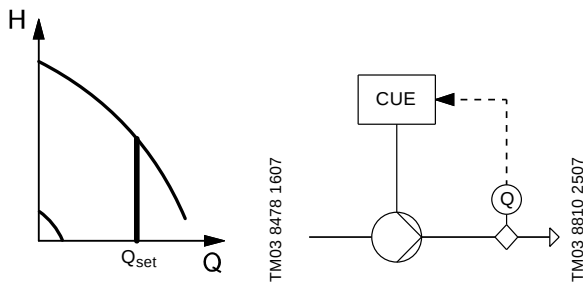


Fig. 50 Constant flow rate

The pump is controlled according to a constant flow rate, represented by the vertical line in the QH diagram.

Constant temperature

The liquid temperature is kept constant, independently of the flow rate. See fig. 51.

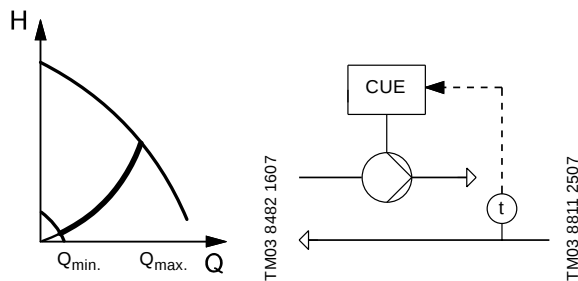


Fig. 51 Constant temperature

The pump is controlled according to a constant temperature. This means that the pump offers a variable flow rate in the Q-range of $Q_{min.}$ to $Q_{max.}$, represented by the parable line in the QH diagram.

Constant other value

Any other value is kept constant. See the CUE installation and operation instructions for further information.

Setpoints

The setpoint is normally set in the menu Operation via the CUE control panel. If needed, the setpoint can be influenced via the external setpoint input.

The CUE offers these setpoint possibilities:

- Setpoint, CUE menu (default)
- External setpoint (default)
- Predefined setpoints (setting via PC Tool)
- GENIbus setpoint (setting via GENIbus).

Setpoint, CUE menu

The setpoint can default be set by the user via the CUE control panel when the CUE is in local operating mode and no digital inputs are used for predefined setpoints.



Fig. 52 Setpoint, CUE menu

The setpoint range depends on the selected control mode.

In control mode "Open loop", the setpoint is set in % corresponding to the required speed. The setting range is between the min. and max. curves in % of nominal frequency.

In control mode "Proportional differential pressure", the setting range is equal to 25 % to 90 % of max. head.

In all other control modes, the setting range is equal to the sensor measuring range.

External setpoint

The setpoint set via the CUE menu can be influenced by connecting an analog signal to the external setpoint input.

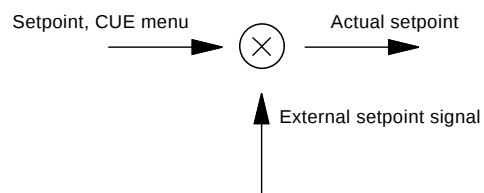


Fig. 53 Setpoint, CUE menu and external setpoint signal

This function offers these possibilities:

- External setpoint (default)
- Inverse external setpoint (setting via control panel)
- External setpoint with stop (setting via PC Tool)
- External setpoint based on a reference table (setting via PC Tool).

The external setpoint signal is used for calculating the actual setpoint. The minimum signal is the minimum setpoint, and the maximum signal is the setpoint set via the CUE menu. See fig. 51.

External setpoint influence (default)

The actual setpoint is a linear function of the external setpoint signal. See fig. 54.

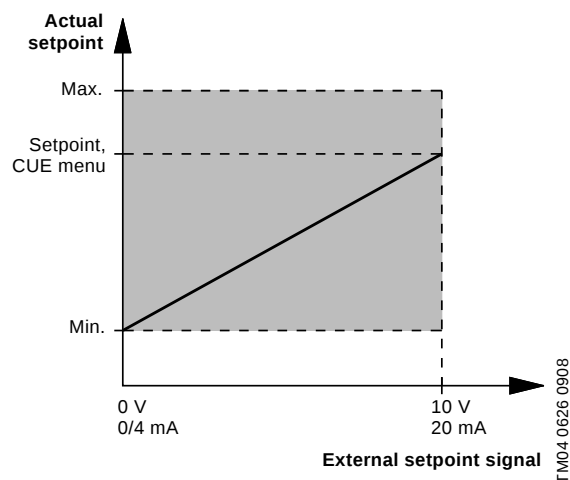


Fig. 54 External setpoint

The minimum and maximum values of the external setpoint signal can be set via PC Tool. See fig. 55.

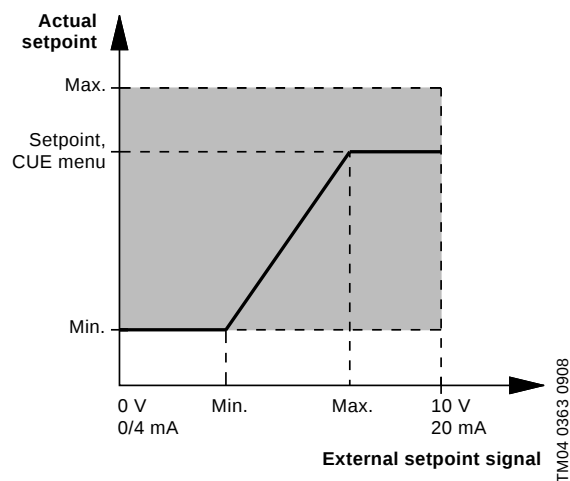


Fig. 55 Reduced external setpoint signal

Inverse external setpoint

The actual setpoint is an inverse linear function of the external setpoint signal. See fig. 56.

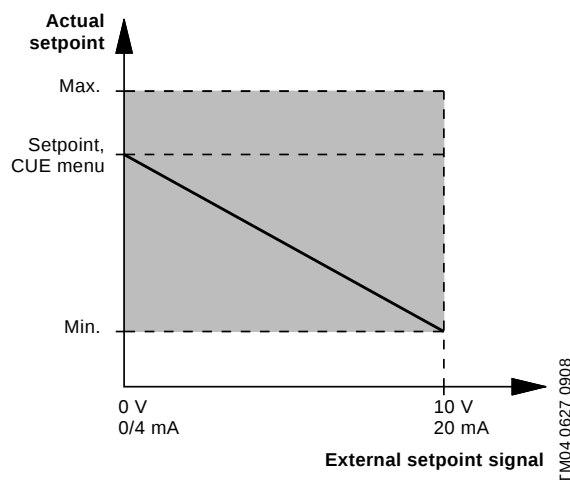


Fig. 56 Inverse external setpoint signal

The minimum and maximum values of the external setpoint signal can be set via the control panel. See fig. 57.

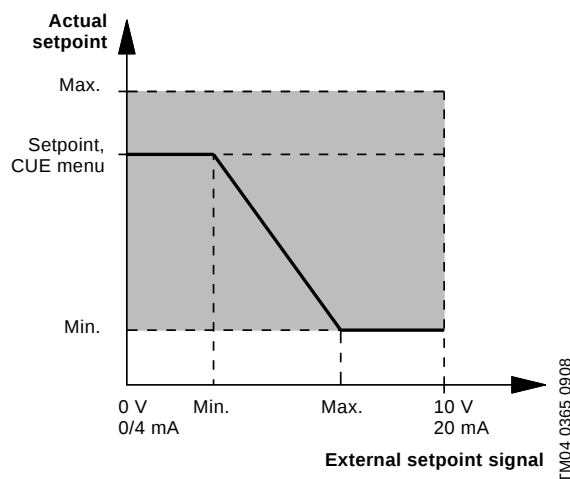


Fig. 57 Reduced inverse external setpoint signal

External setpoint with stop function

Setting via PC Tool.

The actual setpoint with stop is a linear function of the external setpoint signal above 20 % signal and on/off operation below 20 % signal. See fig. 58.

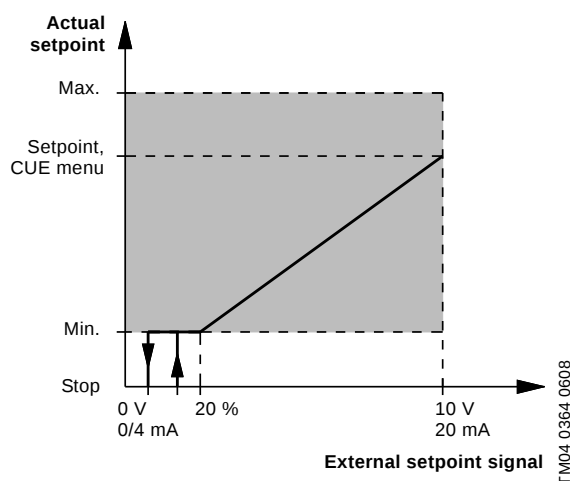


Fig. 58 External setpoint with stop function

When the external setpoint signal is below 10 %, the operating mode is "Stop".

When the external setpoint signal is above 15 %, the operating mode is "Normal".

External setpoint based on a reference table

Setting via PC Tool.

The actual setpoint is a piecewise linear function of the external setpoint signal. See fig. 59.

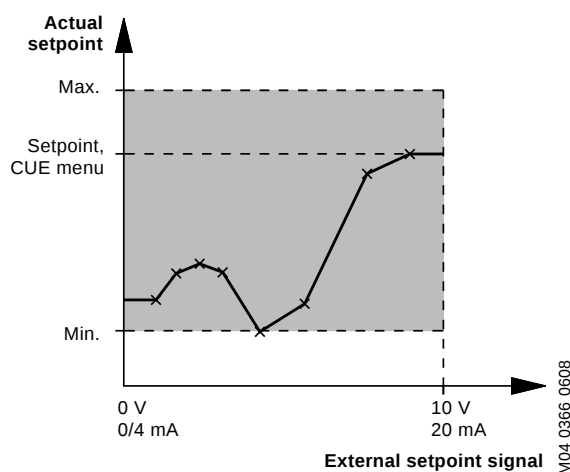


Fig. 59 External setpoint based on a reference table

The linear function is defined as an interpolation between the points in a table. The table has up to eight points.

Predefined setpoints

Setting via PC Tool.

This function makes it possible to select up to seven predefined setpoints using one to three digital inputs. The setpoints are selected as a binary coding of the digital inputs as shown in the table below.

Predefined setpoint	DI 2	DI 3	DI 4
1	x		
2		x	
3	x	x	
4			x
5	x		x
6		x	x
7	x	x	x

x = Closed contact

If none of the digital inputs are activated, the operating mode can be configured to "Stop" or to being controlled according to a setpoint set via the control panel.

If "Min.", "Max." or "Stop" is selected via the control panel, the predefined setpoints are overruled.

Note: Predefined setpoints cannot be influenced by the external setpoint input.

GENIbus setpoint

If the CUE is remote-controlled via the GENIbus input, the setpoint is set via the bus.

Note: The GENIbus setpoint cannot be influenced by the external setpoint signal.

Setting the direction of rotation

The start-up guide is started the first time the CUE is connected to supply voltage. Then while going through the start-up guide, the CUE tests and sets the correct direction of rotation without changing the cable connections to the motor.

The correct direction of rotation can be set in these ways:

- automatic setting.
- manual setting when the direction of rotation is visible.
- manual setting when the direction of rotation is not visible.

Automatic setting

The CUE automatically tests and sets the correct direction of rotation without changing the cable connections.

Automatic setting requires a sensor. The sensor can be a pressure or a flow sensor.

This test is not suitable for all pump types and will in certain cases not be able to determine for certainty the correct direction of rotation. In these cases, the CUE changes over to manual setting where the direction of rotation is determined on the basis of the installer's observations.

Manual setting when the direction of rotation is visible

The correct direction of rotation is set manually without changing the cable connections. This requires that it is possible to observe the motor fan or shaft.

Manual setting when the direction of rotation is not visible

The correct direction of rotation is set manually without changing the cable connections. This requires that it is possible to observe the head or flow rate.

Status functions

The CUE shows these data:

- power consumption
- operating hours
- accumulated flow
- energy per m³.

The status information can be shown in the display.

Power consumption

The value of the power consumption is an accumulated value calculated from the pump's birth and cannot be reset. No additional sensor is required.

Operating hours

The value of operating hours is an accumulated value calculated from the pump's birth and cannot be reset. No additional sensor is required.

Accumulated flow

The value of accumulated flow is calculated by means of a flow measurement from either a digital pulse input or an analog input.

When using a digital input, the number of pulses is counted and multiplied by the litre/pulse parameter in order to get the accumulated flow.

When using an analog input, the accumulated flow value is updated every 10 seconds with the volume pumped in that period.

Energy per m³

The actual energy per m³ (kWh/m³) is calculated as actual power consumption divided by actual flow rate.

Logging functions

Alarm and warning log

The latest five alarms and five warnings are logged with a timestamp corresponding to the power-on time after the fault has occurred. The alarm and warning log can be shown directly on the display.

Correlated histogram (setting via PC Tool)

The correlated histogram is a way to examine the joint distribution of two parameters. The logging for a correlated histogram are count of the number of samples that at the same time are within a given interval of variable 1 and variable 2.

PID controller

The CUE has a built-in PID controller for speed control of pumps. The factory setting of gain (K_p) and integral time (T_i) can easily be changed in the control panel. The controller can operate in both normal and inverse mode.

Normal mode

Normal mode is used in systems in which an increase in pump performance will result in a rise in the value measured at the feedback sensor. This will typically be the case in most CUE applications.

Normal mode is selected by setting the gain (K_p) to a positive value in the control panel.

Inverse mode

Inverse mode is used in systems in which an increase in pump performance will result in a drop in the value measured at the feedback sensor. This mode will typically be used for constant level operation (emptying tank) and for constant temperature operation in cooling systems.

Inverse mode is selected by setting the gain (K_p) to a negative value in the control panel.

Description

The PID controller compares the required setpoint (p_{set}) with the actual value (p) measured by the transmitter (P). See fig. 60.

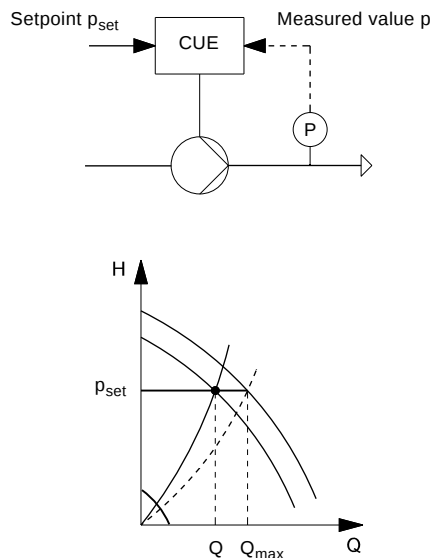


Fig. 60 Constant pressure control

If the measured value is higher than the required setpoint, the PID controller will reduce the speed and the performance of the pump until the measured value is equal to the required setpoint.

Suggested controller settings

System/application	K_p		T_i
	Heating system 1)	Cooling system 2)	
	0.2		0.5
	SP, SP-G, SP-NE: 0.5		0.5
	0.2		0.5
	SP, SP-G, SP-NE: 0.5		0.5
	0.2		0.5
	-2.5		100
	0.5	-0.5	$10 + 5L_2$
	0.5		$10 + 5L_2$
	0.5	-0.5	$30 + 5L_2^*$
	0.5		0.5*
	0.5		$L_1 < 5 \text{ m: } 0.5^*$ $L_1 > 5 \text{ m: } 3^*$ $L_1 > 10 \text{ m: } 5^*$

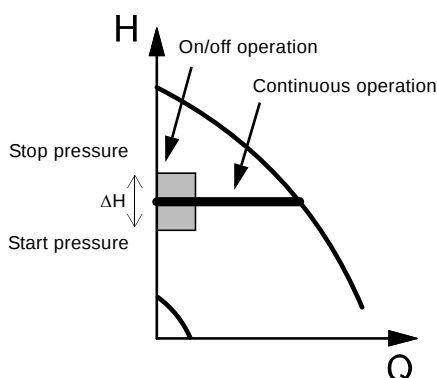
* $T_i = 100$ seconds (factory setting).
Heating systems are systems in which an increase in pump performance will result in a rise in temperature at the sensor.
Cooling systems are systems in which an increase in pump performance will result in a drop in temperature at the sensor.
 L_1 = Distance in [m] between pump and sensor.
 L_2 = Distance in [m] between heat exchanger and sensor.

Stop functions

Constant pressure with stop function

The purpose of the stop function is to stop the pump when low or no flow is detected.

When low flow is detected, the pump is in on/off operation. If there is flow, the pump will continue operating according to the setpoint. See fig. 61.



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Fig. 61 Constant pressure with stop function. Difference between start and stop pressures (ΔH)

Low flow can be detected in two different ways:

- with the built-in low-flow detection function
- with a flow switch connected to a digital input.

Low-flow detection function

The low-flow detection function will check the flow regularly by reducing the speed for a short time. No or only a small change in pressure means that there is low flow.

Low-flow detection with flow switch

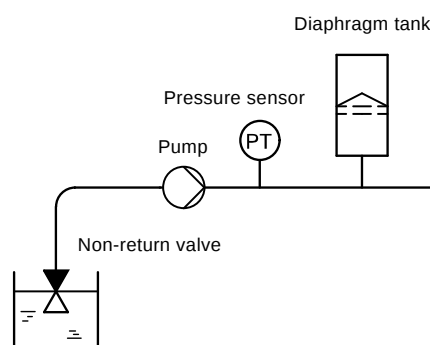
When a flow switch detects low flow, the digital input will be activated.

Operating conditions for the stop function

It is only possible to use the stop function if the system incorporates these components:

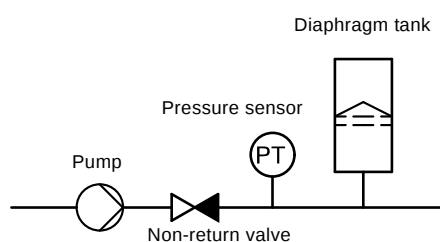
- a pressure sensor
- a non-return valve
- a diaphragm tank.

Note: The non-return valve must always be installed before the pressure sensor. See figs 62 and 63.



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Fig. 62 Position of the non-return valve and pressure sensor in a system with suction lift operation



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Fig. 63 Position of the non-return valve and pressure sensor in a system with positive inlet pressure

Diaphragm tank

The stop function requires a diaphragm tank of a certain minimum size. The tank must be installed as close as possible after the pump, and the precharge pressure must be 0.7 x actual setpoint.

Recommended diaphragm tank size:

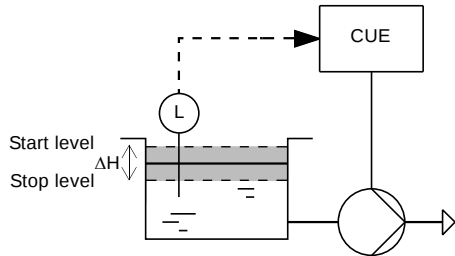
Rated flow rate of pump [m ³ /h]	Typical diaphragm tank size [litres]
0-6	8
7-24	18
25-40	50
41-70	120
71-100	180

If a diaphragm tank of the above size is installed in the system, the factory setting of ΔH is the correct setting. If the tank installed is too small, the pump will start and stop too often.

Constant level with stop function

The purpose of the stop function is to stop the pump when low or no flow is detected.

When low flow is detected, the pump is in on/off operation. If there is flow, the pump will continue operating according to the setpoint. See fig. 64.



TM03 8809 2607

Fig. 64 Constant level with stop function.
Difference between start and stop levels (ΔH)

Low flow can be detected in two different ways:

- with the built-in low-flow detection function
- with a flow switch connected to a digital input.

Low-flow detection function

The low-flow detection function will check the flow regularly by measurement of speed and power.

Low-flow detection with flow switch

When a flow switch detects low flow, the digital input will be activated.

Note: It is only possible to set constant level with stop function if the system incorporates a level sensor, and all valves can be closed.

Dry-running protection

This function protects the pump against dry running. When lack of inlet pressure or water shortage is detected, the pump will be stopped before being damaging.

Lack of inlet pressure or water shortage can be detected in two ways:

- With a switch connected to a digital input configured to dry-running protection.
- The CUE checks if the shaft power is below a dry-pump limit for a configurable time (setting via PC Tool).

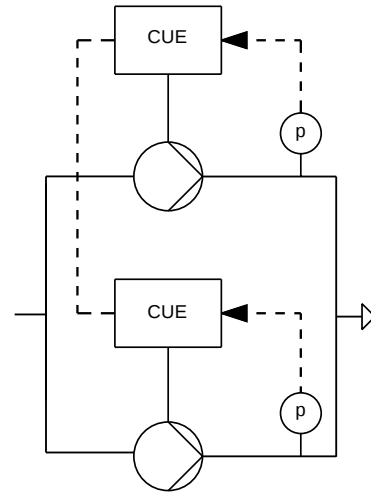
The use of a digital input requires an accessory, such as

- a Grundfos Liqtec® dry-running switch
- a pressure switch installed on the suction side of the pump
- a float switch installed on the suction side of the pump.

The pump cannot restart as long as the input is activated. Restart may be delayed by up to 30 minutes, depending of the pump family.

Duty/standby

The built-in duty/standby function applies to two pumps connected in parallel to ensure reliability of supply. See fig. 65.



TM04 0368 0608

Fig. 65 Two pumps connected in parallel and controlled via GENIbus

These are the primary purposes of the function:

- To let one pump run at the time.
- To start the standby pump if the duty pump stops due to an alarm.
- To alternate the pumps at least every 24 hours.

Description

The two pumps are electrically connected by means of the GENIbus interface. Each pump must be connected to its own CUE and sensor.

Note: The two pumps running duty/standby in this way cannot use the GENIbus interface for remote communication.

The function is activated via the control panel.

Operating mode

The two pumps use their own local operating mode. For instance, pump 1 can operate in "Normal" mode, and pump 2 can operate in "Max." mode.

Control mode

Both pumps must have the same control mode.

Operating range

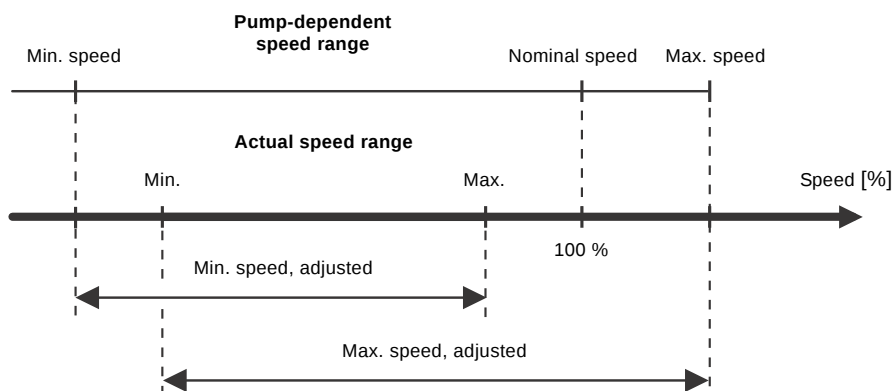
How to set the operating range:

- Set the min. speed within the range from a pump-dependent min. speed to the adjusted max. speed. The factory setting depends on the pump family.
- Set the max. speed within the range from adjusted min. speed to the pump-dependent maximum speed. The factory setting will be equal to 100 %, i.e. the speed stated on the pump nameplate.

The area between the min. and max. speed is the actual operating range of the pump.

The operating range can be changed by the user within the pump-dependent speed range.

For some pump families, oversynchronous operation (max. speed above 100 %) will be possible. This requires an oversize motor to deliver the shaft power required by the pump during oversynchronous operation.



TM04 3581 4608

Fig. 66 Setting of the min. and max. curves in % of maximum performance

Motor bearing monitoring

This function is used to give an indication when it is time to lubricate or change the motor bearings.

It shows these pieces of information:

- When to lubricate the motor bearings.
- How many times lubrication has been confirmed.
- When to replace the motor bearings.

Default function

The default function is based on the "mileage" of the pump and takes into account if the pump has been running with reduced speed.

Extended function

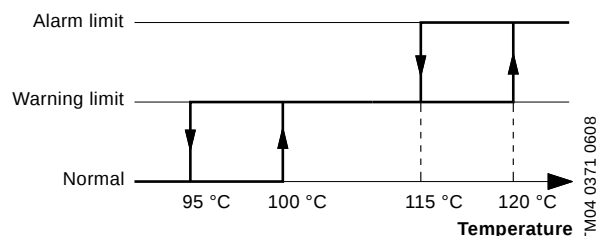
The bearing temperature is also included in the calculation.

The extended function requires an MCB 114 sensor input module and Pt100/Pt1000 sensors measuring the bearing temperature.

Monitoring of motor bearing temperatures

When temperature sensor 1 and 2 are used for measuring the motor bearing temperature, a warning or an alarm will be generated if the bearing temperature gets too high.

Warnings and alarms are generated and reset using hysteresis. See fig. 67.



TM04 0371 0608

Fig. 67 Monitoring of bearing temperature with warning and alarm limits

Standstill heating

This function preheats the motor during standstill in order to avoid condensation within the motor.

When the pump is stopped by a stop command, a current will be applied to the motor windings in order to keep the temperature within the motor above the dewpoint temperature. No external heater is needed.

The preheating of the motor is especially important when the motor is installed under these conditions:

- high humidity
- outdoor installation.

The consequences of condensed moisture within the motor are for example corrosion damage to electrical contacts and the bearings of the motor shaft.

Ramps

The controller incorporates two types of ramp:

- ramp-up and ramp-down (default)
- initial and final ramps (setting via PC Tool).

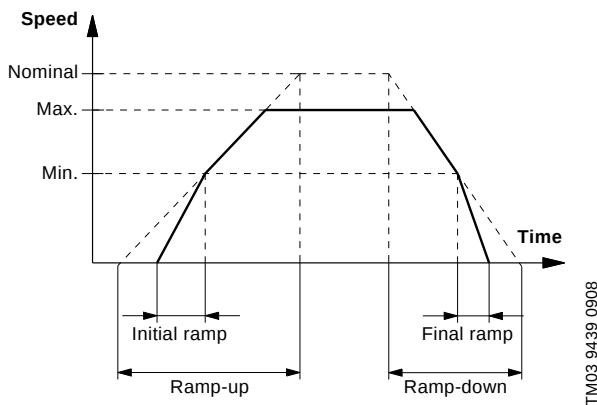


Fig. 68 Ramp-up and ramp-down of the CUE

Ramp-up and ramp-down

The ramp-up and ramp-down are used for protection against overload when starting and stopping the CUE. The setting is done by means of the control panel.

The ramp-up time is the acceleration time from 0 min^{-1} to nominal motor speed.

The ramp-down time is the deceleration time from nominal motor speed to 0 min^{-1} .

Additional set of ramp-up and ramp-down (setting via PC Tool)

An additional set of ramp-up and ramp-down can be remote-set to predefined ramps by means of a digital input.

Initial and final ramps

The initial and final ramps prevent operation for a longer time than necessary at speeds below minimum speed.

The setting is done automatically based on the pump family selected in the start-up guide.

Proportional differential pressure, parabolic

Setting via PC Tool.

The proportional differential pressure can be selected with one of these flow dependencies:

- linear (default), see page 44
- parabolic (setting via PC Tool).

When the flow dependency is selected as parabolic, the differential pressure of the pump will be reduced with a parabolic curve at falling flow rate and increased at rising flow rate. See fig. 69.

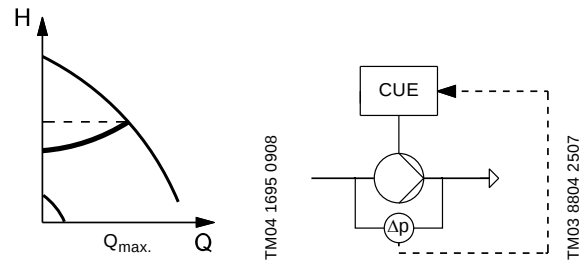


Fig. 69 Proportional differential pressure, parabolic curve

The pump is controlled according to a differential pressure measured across the pump. This means that the pump system offers a flow-compensated differential pressure in the Q -range of 0 to $Q_{\max}$, represented by the parabolic curve in the QH diagram.

$H_{\max}$ update

Setting via PC Tool.

This function is used in connection with the control mode Proportional differential pressure. The purpose is to find the "true" value of the maximum head at no flow and nominal pump speed. See fig. 70.

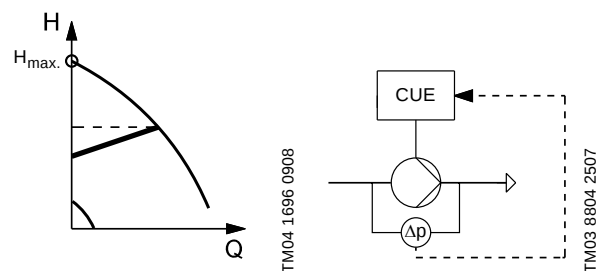


Fig. 70 Proportional differential pressure, $H_{\max}$ update

The function consists of two steps:

1. Ramping up the speed to nominal speed.
 2. Measuring $H_{\max}$ for 20 seconds at nominal speed.
- Valves must be closed so that the pump is operating without flow.

Differential pressure from two sensors

Setting via PC Tool.

The purpose of this function is to make differential pressure control possible by using measurements from two separate pressure sensors.

It can be used in these control modes:

- Proportional differential pressure. See page 44
- Constant differential pressure. See page 44.

The function requires an MCB 114 sensor input module.

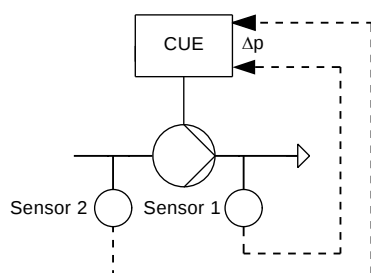


Fig. 71 Differential pressure from two sensors

Sensor 1 is connected to the sensor input 1. Sensor 2 is connected to the sensor input 2 of an MCB 114 sensor input module.

Start delay after power-on

Setting via PC Tool.

The start delay after power-on is a delay between power being applied and the pump starting.

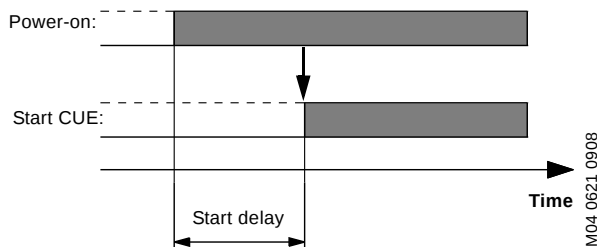


Fig. 72 Start delay after power-on

The purpose is to allow remote control equipment to start up before the pump.

The start delay is deactivated if a remote command is received via GENIbus.

Auto/manual restart after alarm

Setting via PC Tool.

In case of an alarm, the CUE will stop the pump or change the operating mode, depending on the alarm and pump type.

Pump operation will be resumed when the cause of the alarm has been remedied and the alarm has been reset automatically or manually.

The CUE can be configured to activate and deactivate automatic restart for all alarms or for groups of alarms.

Limit exceeded

Setting via PC Tool.

This is a monitoring function offering information, warning or alarm when a low or high limit is exceeded. See fig. 73.

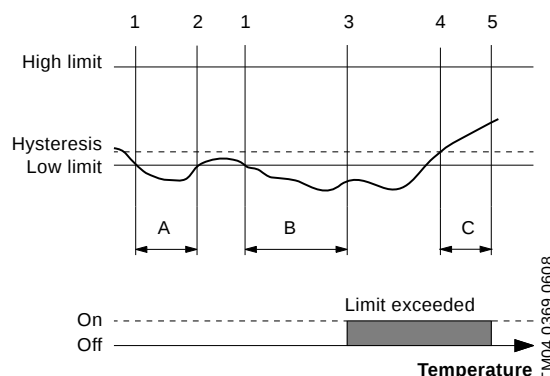


Fig. 73 Example of low limit exceeded

Description

The function has two timers: a detection delay timer and a reset delay timer.

The detection delay timer starts when a limit is exceeded (1). See fig. 73. The time is configurable.

A: If the limit is no longer exceeded (2) when the detection time expires, the timer will be reset.

B: If the limit is still exceeded (3) when the detection time expires, the output of the detector will change to "limit exceeded".

The reset delay timer will start when the detector output is "limit exceeded" and the limit is no longer exceeded, using hysteresis (4).

C: When the delay time has expired (5), the detector output will change to "limit not exceeded".

Input possibilities

It is possible to have two limit exceeded functions in parallel with these inputs:

- all analog inputs
- all Pt100/Pt1000 inputs.

The use of Pt100/Pt100 inputs requires an MCB 114 sensor input module.

Output possibilities

There are these output possibilities:

- signal relay 1 and 2
- analog output
- warning and alarm.

Note: The default setting of this function is "Not active".

Copy of settings

It is possible to copy the settings of a CUE to another CUE of the same size and firmware version.

There are two possibilities:

- To copy the settings of a CUE to the control panel.
- To copy the settings stored in the control panel to a CUE.

Both functions must be used in the correct order to copy settings from one CUE to another. A setup can be used for more than once when it has been copied into the Grundfos Local Control Panel.

Pipe fill (PC Tool)

This function is used for filling empty pipes with water in a controlled manner. If the function is not activated, pipes will be filled at maximum speed. In pressure-controlled systems where pipes are empty at start-up, high speed will cause water hammer until the speed has been reduced to fit the actual demand.

Water hammer can be prevented by introducing a pipe fill sequence before the system is running normal operation.

The pipe fill function can limit the speed of the pump when filling pipes, and thus reduce water hammer in filled pipes. A time limit or a pressure can be set to deactivate the pipe fill function and turn the CUE into normal operation.

Parameters

Pipe fill

- Activation or deactivation of the function.

Pipe fill speed

- Maximum speed used during pipe fill (horizontal piping).

Pipe fill time

- The time it takes to fill the pipes. The CUE will change to normal operation when the time has expired.

Pipe fill rate

- If a vertical pipe system is to be filled, a pipe fill rate can be set. Example: [0.3 bar/sec] (vertical piping). The setting depends on the transmitter used.

Filled setpoint

- Setpoint where the pipe fill function is deactivated, and the CUE changes to normal operation.

Digital inputs

As standard, the CUE offers these digital inputs:

- one digital input for external start/stop
- three programmable digital inputs.

The three digital inputs can be set to these functions:

- min. (min. curve)
- max. (max. curve)
- external fault
- flow switch
- alarm reset
- dry-running protection (via external switch)
- accumulated flow (pulse flow, only DI 4)
- predefined ramps (setting via PC Tool)
- predefined setpoints (setting via PC Tool).

Start/stop

The pump will start if the pump is ready to run (the state of the on/off button is on, and no alarms prevent the pump from running).

Min.

The pump will run according to the min. curve.

Max.

The pump will run according to the max. curve.

External fault

If the input is activated for more than 5 seconds, external fault will be indicated.

Flow switch

The flow switch indicates no flow in constant pressure with stop function and constant level with stop function. It requires an external signal from a flow switch or a controller.

Alarm reset

When the input has been activated, the alarm will be reset if the cause of the alarm no longer exists.

Dry running

Indicates lack of inlet pressure or water shortage, and the pump will be stopped. The pump cannot restart as long as the input is activated. Restart may be delayed by up to 30 minutes, depending of the pump family.

For further information, see page 52.

Accumulated flow (only DI 4)

The number of pulses is counted and multiplied by the litre/pulse parameter in order to get the accumulated flow. This requires the use of an accessory, such as a pulse sensor.

Predefined ramps (setting via PC Tool)

The ramp-up and ramp-down time can be remote-set from the default setting to a predefined setting by means of PC Tool. An additional set of ramps can be selected via a digital input. The alternative ramps are set via PC Tool.

For further information, see page 54.

Predefined setpoints (setting via PC Tool)

One to seven predefined setpoints can be selected via digital inputs configured for this purpose.

Signal relays

The two relay outputs can be independently set to these indications:

- ready
- alarm
- operation
- pump running
- warning
- lubricate
- external control (setting via PC Tool)
- limit exceeded (setting via PC Tool).

Ready

The pump is ready to run or running.

Warning

There is a warning.

Alarm

There is an alarm.

Operation

The pump is running or has been stopped by a stop function.

Pump running

The pump is running.

Lubricate

Lubrication time is exceeded.

External relay control (setting via PC Tool)

This function offers information, warning or alarm when a signal is given via GENIbus.

Limit exceeded (setting via PC Tool)

This function offers information, warning or alarm when a low or high limit is exceeded.

Analog inputs

As standard, the CUE offers these analog inputs:

- one analog input for external setpoint
- one analog input for sensor 1.

External setpoint

The setpoint can be influenced by connecting an analog signal to the setpoint input.

For further information, see page 46.

Sensor 1

The sensor 1 is default used for control in closed loop. In open loop, sensor 1 can be used for monitoring.

In closed loop, the feedback signal is kept at a given setpoint by a PID controller.

Switches A53 and A54 must be set according to signal type.

Analog output

The analog output (0-20 mA) can be set via the PC Tool to one of these indications:

- feedback value
- speed
- frequency
- motor current
- external setpoint input
- limit exceeded.

The analog output is default set to not active.

Feedback value

The output signal is a function of the actual feedback value.

Min: Minimum feedback (0/4 mA).

Max: Maximum feedback (20 mA).

Scaling: Linear.

Speed

The output signal is a function of the actual pump speed.

Min: 0 rpm.

Max: Speed according to maximum frequency.

Scaling: Linear.

Frequency

The output signal is a function of the actual frequency.

Min: 0 rpm.

Max: Maximum frequency.

Scaling: Linear.

Motor current

The output signal is a function of the actual motor current.

Min: 0 A.

Max: 2 x nominal motor current.

Scaling: Linear.

External setpoint input

The output signal is a function of the external setpoint input.

Min: 0 V.

Max: 10 V.

Scaling: Linear.

Limit exceeded

The output signal indicates whether the limit is exceeded:

Min: Limit not exceeded (0 mA).

Max: Limit exceeded (20 mA).

Scaling: On/off.

GENIbus

The CUE supports serial communication via the RS-485 connection. The communication enables connection to a building management system or another external control system.

Operating parameters, such as setpoint and operating mode, can be remote-set via the bus signal. At the same time, the pump can provide status information about important parameters, such as actual value of control parameter, input power and fault indications.

Protocol

Using GENIbus interface, the protocol selection of the RS-485 port must be selected to GENIbus, and the communication must be set according to the Grundfos GENIbus standard.

Pump number

Using GENIbus interface, a pump number between 1 and 199 must be allocated to each pump via the control panel.

Local/remote operating mode

In local operating mode, the unit is controlled from local sources, i.e. control panel and digital input.

In remote operating mode, the unit is controlled via GENIbus. Change to remote operating mode is done via the GENIbus.

Priority of settings

The CUE can be controlled in various ways at the same time. If two or more operating modes are active at the same time, the operating mode with the highest priority will be in force.

Local operating mode

Priority	CUE menu	External signal
1.	Stop	
2.	Max.	
3.		Stop
4.		Max.
5.	Min.	Min.
6.	Normal	Normal

Example: If an external signal has activated the operating mode "Max.", it will only be possible to stop the pump.

Remote operating mode

Priority	CUE menu	External signal	Bus signal
1.	Stop		
2.	Max.		
3.		Stop	Stop
4.			Max.
5.			Min.
6.			Normal

Example: If the bus signal has activated the operating mode "Max.", it will only be possible to stop the pump.

MCB 114 sensor input module

The MCB 114 sensor input module offers three additional analog inputs for the CUE:

- one analog 0/4-20 mA input for an additional sensor
- two analog Pt100/Pt1000 inputs for temperature sensors.

Sensor 2

The analog 0/4-20 mA input is used for these functions:

- Monitoring of measured value of sensor 2 (default setting).
- Measured value of sensor 2 used for control purpose. This makes differential pressure control possible by using measurements from sensor 1 and sensor 2 (setting by means of PC Tool).

Temperature sensors 1 and 2

The analog Pt100/Pt1000 inputs are used for monitoring of these temperatures:

- drive-end motor bearing
- non drive-end motor bearing
- other liquid 1
- other liquid 2
- motor windings
- pumped liquid
- ambient temperature.

Displays

MCB 114 input	Displays	
	Reading	Setting
Sensor 2	(2.5)	(3.16)
Temperature sensor 1	(2.12)	(3.21)
Temperature sensor 2	(2.13)	(3.22)

Further information

See also the CUE and MCB 114 installation and operating instructions.

Output filters

Grundfos offers two types of output filter as accessories for the CUE:

- dU/dt filters
- sine-wave filters.

The filters are in IP20/NEMA1 enclosure.



GrA 4456

Fig. 74 Wall-mounted sine-wave filters

Use of output filters

The table below explains in which cases an output filter is required. From the table, it can be seen if a filter is needed and which type to use.

Pump type	CUE output power	dU/dt filter	Sine-wave filter
SP, BM, BMB with 380 V motor and up	Up to 7.5 kW	-	0-300 m
	11 kW and up	0-150 m	150-300 m
Pumps with MG 71 and MG 80 motors up to 1.5 kW, and other pumps (noise reduction)	Up to 7.5 kW	-	0-300 m
	11 kW and up	0-150 m	150-300 m
Other pumps (higher noise reduction)	Up to 7.5 kW	-	0-300 m
	11 kW and up	-	0-300 m
Pumps with 690 V motor	All	0-150 m	150-300 m

The lengths stated apply to the motor cable.

MP 204 motor protection

Developed especially for pumps by Grundfos pump specialists, the MP 204 motor protection unit brings you motor protection that is as reliable as it is simple to use. In effect, we did all the hard bits for you. The result is a unit that protects your pump 24 hours a day and in addition lets you monitor your energy consumption - and never loses sight of user-friendliness.



TM03 0150 4204

Fig. 75 The MP 204 motor protection unit

Easy installation

Installing the MP 204 is extremely easy. It can be mounted by means of four screws onto any wall or back plate, or simply slid into place on a mounting rail. With just one product for all situations, you do not need to worry about choosing the right motor protection unit for your pump or motor. The MP 204 covers the range from 3 to 999 amps as well as voltages from 100 to 480 VAC and is easily set up in under two minutes

Ensure system reliability

The MP 204 protects pump motors against under-voltage, over-voltage and other variations in power supply, ensuring your pump continues its steady performance. Your pump motors will also be protected against the overheating that accompanies such variations and reduces pump lifetime. In addition to the reliability offered by motor protection, MP 204 also acts as a monitoring device for energy consumption, meaning you can take measures for optimisation.

The motor protector consists of:

- a cabinet incorporating instrument transformers and electronics.
- a control panel with operating buttons and display for reading of data.

The MP 204 operates with two sets of limits:

- a set of warning limits and
- a set of trip limits.

If one or more of the warning limits are exceeded, the motor continues to run, but the warnings will appear in the MP 204 display. If one of the trip limits is exceeded, the trip relay stops the motor. At the same time, the signal relay is operating to indicate that the limit has been exceeded. Some values only have a warning limit. The warning can also be read out by means of the Grundfos R100 remote control.

Applications

The MP 204 can be used as a stand-alone motor protector. The MP 204 may also be incorporated in a Grundfos Dedicated Controls system in which it functions as a motor protector and data collection unit transmitting measured values via the Grundfos GENIbus to the Grundfos CU 362 control unit or other units in the system.

Monitoring of the MP 204 is possible via a Grundfos GENIbus.

The power supply to the MP 204 is in parallel with the supply to the motor. Motor currents up to 120 A are passed directly through the MP 204. The MP 204 protects the motor primarily by measuring the motor current by means of a true RMS measurement. The MP 204 disconnects the contactor if, for example, the current exceeds the preset value. The pump is protected secondarily by measuring the temperature with a Tempcon sensor, a Pt100/Pt1000 sensor and a PTC sensor/thermal switch.

The MP 204 is designed for single- and three-phase motors. In single-phase motors, the starting and run capacitors are also measured. Cos ϕ is measured in both single- and three-phase systems.

Product range

- MP 204
- External current transformers up to 1000 A.

Functions

- Phase-sequence monitoring
- Indication of current or temperature (user selection)
- Input for PTC/thermal switch
- Indication of temperature in °C or °F (user selection)
- 4-digit, 7-segment display
- Setting and status reading with the R100
- Setting and status reading via the GENIbus.

Tripping conditions

- Overload
- Underload (dry running)
- Temperature (Tempcon sensor, PTC/thermal switch and Pt sensor)
- Missing phase
- Phase sequence
- Overvoltage
- Undervoltage
- Power factor ($\cos \varphi$)
- Current unbalance.

Warnings

- Overload
- Underload
- Temperature (Tempcon, and Pt sensor)
- Overvoltage
- Undervoltage
- Power factor ($\cos \varphi$).

Note: In connection with single- and three-phase connection.

- Run capacitor (single-phase operation)
- Starting capacitor (single-phase operation)
- Loss of communication in network
- Harmonic distortion.

Learning function

- Phase sequence (three-phase operation)
- Run capacitor (single-phase operation)
- Starting capacitor (single-phase operation)
- Identification and measurement of Pt100/Pt1000 sensor circuit.

Factory settings

Current limit: 0 A
 Nominal voltage: 400 V
 Class: P (trip delay: 10 seconds)
 Trip delay: 5 seconds
 Number of phases: 3, non-earthed
 Power-on delay: 2 seconds.
 Learning function: Active.
 Active trip limits
 Overload according to class
 Underload: -40 %
 Overvoltage: +20 %
 Undervoltage: -20 %
 Phase-sequence monitoring
 Current unbalance: 10 %
 PTC/thermal switch.

Note: The overvoltage and undervoltage trip limits will be deactivated automatically if the temperature monitoring with Tempcon or Pt100/Pt1000 has been set to active.

Active warnings

Run capacitor, low: -50 %
 Starting capacitor, low: -50 %.

One control panel for your convenience

Grundfos has put everything together in one straight forward control panel. The main switch and the LED panel showing power consumption are all you see on the front. Inside you find the MP 204 unit and optional communication interface units, ready to go.

Wiring diagrams

Three-phase system

The wiring diagram, fig. 76, shows an example of a three-phase pump with insulation measurement.

The connections to L1, L2, L3 and "5" can be made with a cable of up to 10 mm². A special fuse unit up to approx. 50 A is therefore not required.

If larger back-up fuses are used, the voltage to the L1, L2 and L3 must be protected separately. A maximum of 10 A or less is recommended.

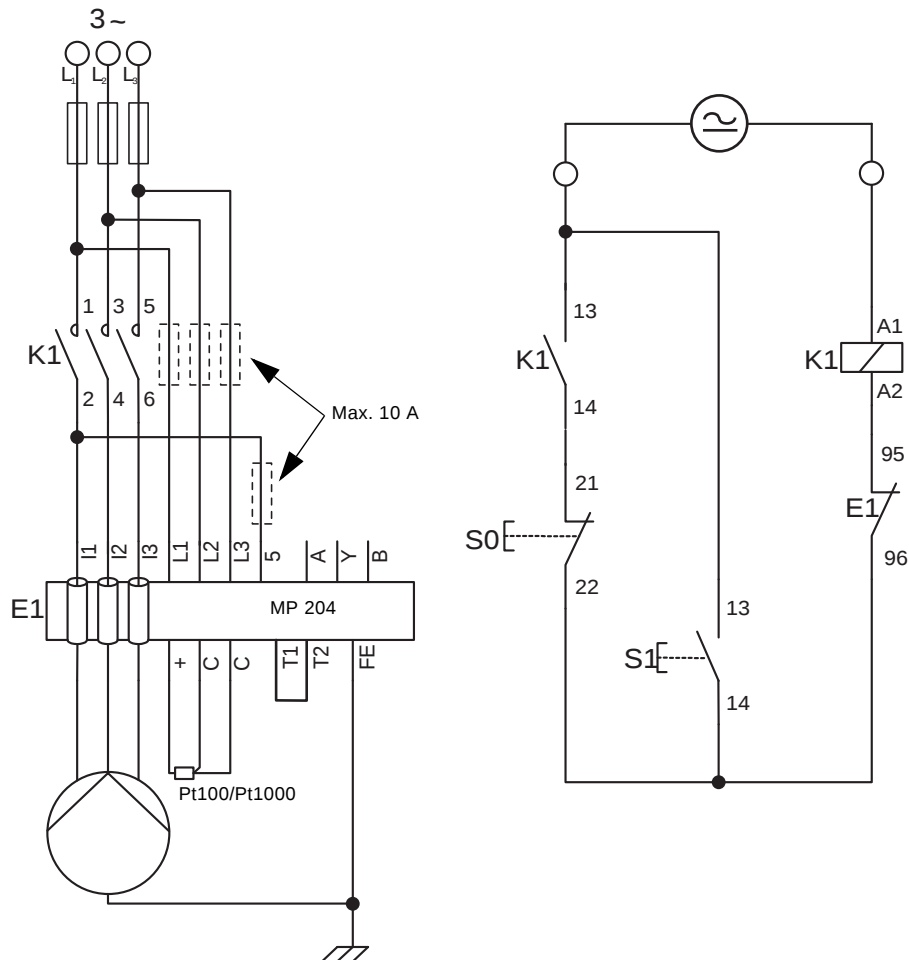


Fig. 76 Three-phase connection

TM03 0122 2205

Three-phase system with external current transformers

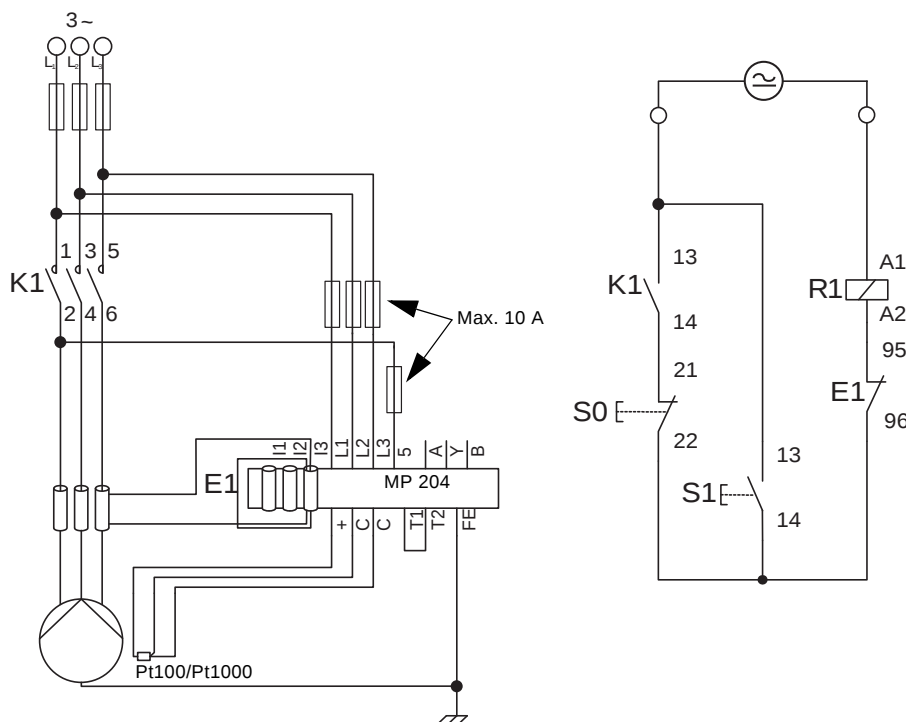


Fig. 77 Three-phase connection with current transformers

4. Sensor modules

IO 113 (SM 113)

General description

The IO113 provides an interface between a Grundfos wastewater pump or mixer equipped with sensors and the pump controller(s). The most important sensor status information is indicated on the front panel.

One pump or mixer can be connected to one IO 113 module.

Together with the sensors, the IO 113 provides a galvanic isolation between the motor voltage in the pump or mixer and the connected controller(s).

The IO 113 can do the following as standard:

- protect the pump against overheating.
 - monitor the status of these items:
 - motor winding temperature
 - leakage (WIO/WIA)*
 - moisture in pump or mixer.
 - measure the stator insulation resistance.
 - stop the pump or mixer in case of alarm.
 - remotely monitor the pump via RS-485 communication (Modbus or GENIbus).
 - control pump or mixer via a frequency converter.
- When the IO 113 is combined with an SM 113, it is also possible to monitor the following:
- bearing temperature
 - vibration in pump or mixer
 - rotor speed when the motor is powered off.

* WIO and WIA are the abbreviations for water-in-oil and water-in-air.

If SM 113 is installed, connection of the leakage sensor should be done via the SM 113 device.



Warning

The IO 113 must not be used for other purposes than those specified above.

User interface

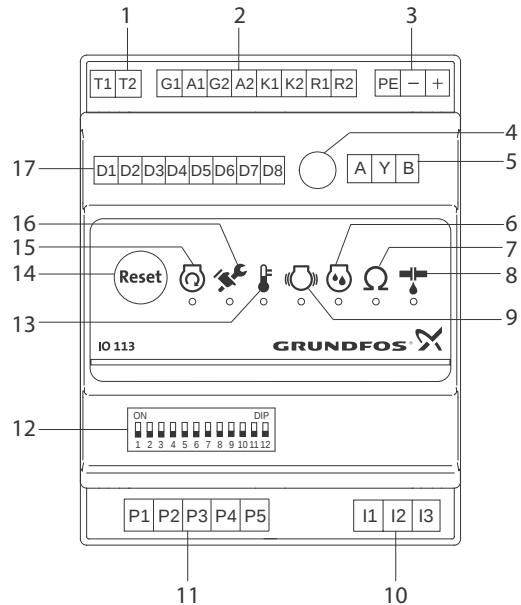


Fig. 1 IO 113 module

Pos.	Description
1	Terminals for alarm relay
2	Terminals for analog and digital inputs and outputs
3	Terminals for supply voltage.
4	Potentiometer for setting the warning limit of stator insulation resistance
5	Terminals for RS-485 for GENIbus or Modbus
6	Indicator light for measurement of moisture
7	Indicator light for stator insulation resistance
8	Indicator light for leakage (WIO/WIA)
9	Indicator light for vibration in pump or mixer
10	Terminals for measurement of stator insulation resistance
11	Terminals for connection of pump sensors
12	DIP switch for configuration
13	Indicator light for motor temperature
14	Button for resetting alarms
15	Indicator light for motor running
16	Indicator light for service
17	Terminals for digital outputs

TM05 1881 3811

Identification

Type key

Code	Meaning	IO	1	1	3
IO	Input/output unit				
11	Controller series				
3	Model number				

Nameplate

The nameplate is fitted on the side of the IO 113.

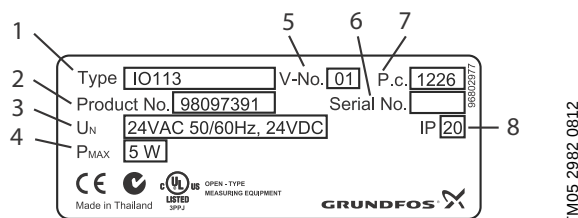


Fig. 2 Nameplate

Pos.	Description
1	Type designation
2	Product number
3	Rated voltage
4	Power
5	Version number
6	Serial number
7	Production code (year and week)
8	Enclosure class

Approval



The IO 113 is UL listed to US and Canadian safety standards.

Variants

The IO 113 is available in two variants:

- without communication module (standard variant)
- with communication module.

The product number (pos. 2 on the nameplate) shows the variant:

- 98097391 = standard variant
- 98097390 = variant with communication module.

Expansion using SM 113

SM 113 may be used for the collection and transfer of additional sensor data. SM 113 works together with the IO 113 (98097390) as shown below.

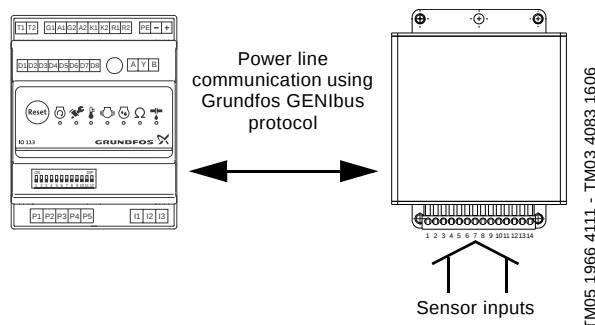


Fig. 3 IO 113 and SM 113

SM 113 can either be built into a pump or mixer, or mounted next to the IO 113 in a control cabinet.

SM 113 can collect data from these devices:

- 3 current sensors, 4-20 mA
- 3 Pt100/Pt1000 thermal sensors
- 1 digital input (speed)
- WIO/WIA sensor.

WIO/WIA sensor

Warning

The WIO/WIA sensor has been approved according to EN/IEC 60079-18:2004.



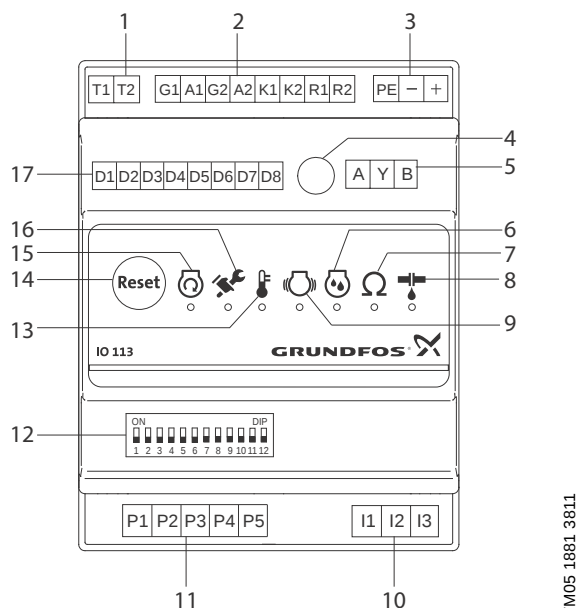
In Ex and IEC Ex applications, the maximum current supplied to the sensor must not exceed 350 mA according to EN/IEC 60079-18:2004.

Note: As the IO 113 is equipped with this current limitation, no further protection is required when using the IO 113.

Marking:

Grundfos WIO/WIA sensor 96xxxxxx PCxxxx-xxx, max. 24 VDC, $T_{amb.}$ 0 °C to +70 °C; KEMA 05ATEX2176X, EX II 2GD Ex mb II T4, T 135 °C IEC Ex KEM 05.0019X, Ex mb II T4, CE 0344, IP68.

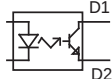
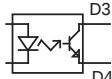
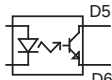
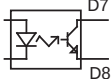
Functions



TM05 1881 3811

Fig. 4 IO 113 module

Pos.	Terminal	Description	Data	Function	Diagram
1	T1	Terminal for alarm relay	Max. 250 VAC	All alarms trip the alarm relay. The alarm relay is closed during normal operation. In case of alarm or if IO 113 is not connected to the power supply, the relay opens and breaks the connection between T1 and T2.	
	T2	Terminal for alarm relay	Max. 250 VAC		
2	G1	GND for analog output 1	1) 0 V 2) 0 V	Analog output 1 has two functions set via DIP switch 8. 1. 4-20 mA for content of water in oil. Load resistance: Max. 250 Ω. 2. Pulse output for content of water in oil and stator insulation resistance.	
	A1	Terminal for analog output 1	1) 15 VDC 2) 24 VDC, max. 100 mA		
	G2	GND for analog output 2	1) 0 V 2) 0 V	Analog output 2 has two indications set via DIP switch 7. 1. 4-20 mA for stator winding temperature. Load resistance: Max. 250 Ω. Note: There is no 4-20 mA signal if pump or mixer is installed with PTC sensor. 2. Pt1000 emulator for stator winding temperature.	
	A2	Terminal for analog output 2	1) 15 VDC 2) 24 VDC, rated 1 mA		
	K1	GND connection	0 V	Feedback from motor contactor whether the pump is running or not. The input must be short-circuited when the pump is running. The signal is used by the IO 113 for filtering measuring signals and for analysis during fault indication.	
	K2	Terminal for conductor for contactor status	Digital input		
	R1	GND connection	0 V	For resetting of alarms. The input must be short-circuited when alarms are reset.	
	R2	Terminal for resetting	Digital input		
3	PE	Earth	Earth	Supply voltage to IO 113	
	-	GND for supply voltage	0 VDC 24 VAC ± 10 %		
	+	Positive for supply voltage	24 VAC ± 10 % 24 VDC ± 10 %		
5	A	RS-485 A	Bus input	RS-485 communication connection (9600 baud)	
	Y	RS-485 GND	0 V		
	B	RS-485 B	Bus input		
10	I1	Earth	Earth	The insulation resistance between stator windings and earth is measured. The measurement is only correct when the motor is stopped. Measurement voltage: 10 VDC.	
	I2	Not connected	-		
	I3	Terminal for measurement of stator insulation resistance	CAT II 600 V		

Pos.	Terminal	Description	Data	Function	Diagram
11	P1	Terminal for sensors in the pump	Sensor input	Thermal switch or PTC sensor according to DIN 44081 and 44082. P1 to P5 are used for the connection of sensors in the pump or mixer. All sensors in contact with phase voltage must be double insulated according to EN 61010-1.	
	P2	Terminal for supply voltage to sensors in the pump	15 V		
	P3	Terminal for sensors in the pump	Sensor input		
	P4	Terminal for supply voltage to sensors in the pump	15 V		
	P5	Terminal for sensors in the pump	Sensor input		
17	D1	Terminal for alarm in case of too high stator temperature	Digital output 24 VDC min. 10 kΩ	Alarm for temperature too high in the stator windings. The output is closed during normal operation. If an alarm occurs, the connection is broken between D1 and D2.	
	D2	GND for alarm in case of too high stator temperature	0 V		
	D3	Terminal for alarm in case of moisture in the pump or mixer	Digital output 24 VDC min. 10 kΩ	Alarm for moisture in the motor part of the pump. The output is closed during normal operation. If an alarm occurs, the connection is broken between D3 and D4.	
	D4	GND for alarm in case of moisture in the pump or mixer	0 V		
	D5	Output for alarm in case of insulation fault	Digital output 24 VDC min. 10 kΩ	Alarm for too low insulation value between stator windings and earth. The output is closed during normal operation. If an alarm occurs, the connection is broken between D5 and D6.	
	D6	GND for alarm in case of insulation fault	0 V		
	D7	Terminal for warning	Digital output 24 VDC min. 10 kΩ	Warning: The output is closed during normal operation. If a warning occurs, the connection is broken between D7 and D8. The following warnings can occur: - communication warning - configuration warning - too much water in oil - stator insulation resistance below warning limit. See section <i>Description of indicator lights</i> .	
	D8	GND for warning	0 V		

Indication and function

On the front the IO 113 has seven indicator lights for sensor status. Figure 10 shows the location of lights on the IO 113, and the table explains their meanings.

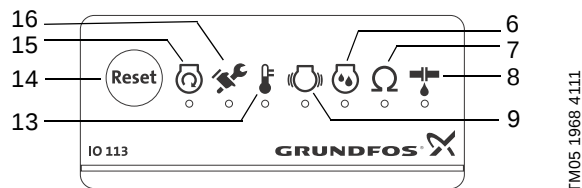


Fig. 5 Indicator lights on the IO 113

Description of indicator lights

Pos.	Symbol	Description
6		Moisture Red indicator light flashing for alarm in case of moisture in the motor, or the IO 113 is not configured correctly for the pump or mixer. The indicator lights (pos. 6 and 13) will flash alternately if the IO 113 is not set correctly for the connected pump variant. This indicates a configuration alarm.
7		Insulation resistance Stator insulation resistance is indicated by green, yellow or red lights. Green indicator light is on when the insulation resistance is OK, i.e. above the warning level set on the potentiometer (pos. 4). Yellow indicator light is permanently on when the warning limit has been reached. Red indicator light flashing when the alarm limit has been reached, i.e. below 1 MΩ. Note: The indicator lights are only active if the conductor for contactor status is connected (K1, K2, pos. 2). This measurement is only correct when the motor is stopped.
8		Leakage For wastewater pumps or mixers: Green indicator light permanently on indicates leakage < 5 % Green indicator light flashing indicates 5 % < leakage < 10 % Yellow indicator light permanently on indicates 10 % < leakage < 15 % Red indicator light flashing indicates 15 % < leakage < 20 % Red indicator light permanently on indicates leakage > 20 %, or oil chamber is empty For SMG/SFG/SRG: Green indicator light permanently on indicates leakage < 0.5 % Green indicator light flashing indicates 0.5 % < leakage < 1 % Yellow indicator light permanently on indicates 1 % < leakage < 1.5 % Red indicator light flashing indicates 1.5 % < leakage < 2 % Red indicator light permanently on indicates leakage > 2 %, or oil chamber is empty For SE/SL 9-30 kW: Green indicator light permanently on indicates pump healthy Red indicator light flashing indicates alarm
9		Vibration Yellow indicator light permanently on when vibrations are in the warning range.
13		Temperature Red indicator light flashing for alarm when temperature is above the limit. If ATEX/IEC Ex protection is activated (DIP switch 10, pos. 12), this indicator light can also indicate: - Bearing temperature too high. - Missing signal from bearing sensor (with SM 113).
15		Motor running Green indicator light is permanently on when motor is running. Note: The indicator light is only active if the conductor for contactor status is connected (K1, K2, pos. 2).
16		Service Yellow indicator light permanently on when there is a communication problem between IO 113 and SM 113. Yellow indicator light flashing when there is a configuration setting conflict. Immediate service is needed.

SM 113

General description

SM 113 is designed and used for the collection and transfer of additional sensor data. SM 113 works together with the IO 113 (with communication module, product number is 98097390) as shown below.

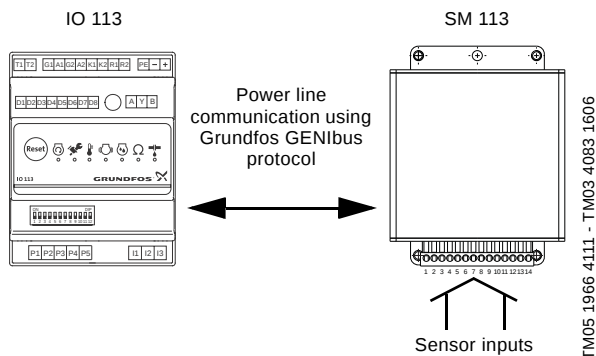


Fig. 6 IO 113 and SM 113

SM 113 can be built into either a pump or mixer, or it can be mounted next to the IO 113 in a control cabinet.

SM 113 can collect data from these devices:

- current sensors, 4-20 mA*
- Pt100**/Pt1000*** thermal sensors
- speed sensors

* For instance water-in-oil (WIO) and water-in-air (WIA) sensor.

** Maximum 3 Pt100 sensors.

*** Maximum 4 Pt1000 sensors.

User interface

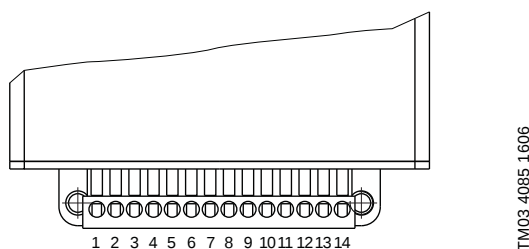


Fig. 7 Connection pins

Pin	Type	Description
1	4-20 mA	Vibration sensor
2	4-20 mA	Additional input
3	13.5 VDC	Supply output for 4-20 mA sensors
4	4-20 mA	Water-in-oil / water-in-air sensor
5	GND	Common ground for sensors
6	P5	Communication signal for IO 113
7	PE	Protective earth
8	P4	Supply input for sensor board from IO 113
9	n/a	-
10	Pt1000	Stator temperature
11	Speed	Digital input from speed sensor
12	Pt100/Pt1000	Main bearing temperature
13	Pt100/Pt1000	Support bearing temperature
14	Pt100/Pt1000	Stator temperature

Identification

Type key

Code	Meaning	SM	1	1	3
SM	Sensor board				
11	Controller series				
3	Model number				

Nameplate

The nameplate is fitted on the front of the SM 113.

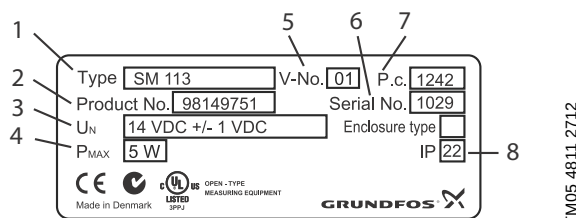


Fig. 8 Nameplate

Pos.	Description
1	Type designation
2	Product number
3	Rated voltage
4	Power
5	Version number
6	Serial number
7	Production code (year and week)
8	Enclosure class

Approval



The SM 113 is UL listed to US and Canadian safety standards.

Variants

The SM 113 is only available in one variant.

The product number (pos. 2 on the nameplate) shows the variant:

- 98149751 = standard variant

Note

SM 113 must be used in combination with IO 113.

WIO/WIA sensor**Warning**

The WIO/WIA sensor has been approved according to EN/IEC 60079-18:2004.



In Ex and IEC Ex applications, the maximum current supplied to the sensor must not exceed 350 mA according to EN/IEC 60079-18:2004.

Note: As the IO 113 is equipped with this current limitation output to SM 113, no further protection is required when the IO 113 is combined with SM 113.

Marking:

Grundfos WIO/WIA sensor 96xxxxxx PCxxxx-xxx,
max. 24 VDC, T_{amb.} 0 °C to +70 °C; KEMA
05ATEX2176X, EX II 2GD Ex mb II T4, T 135 °C
IEC Ex KEM 05.0019X, Ex mb II T4, CE 0344, IP68.

Liqtec

The LiqTec

- protects the pump against dry-running.
- protects the pump against too high liquid temperature ($130\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$).
- can monitor the motor temperature if the PTC sensor in the motor has been connected.
- has a fail-safe design. If the sensor, sensor cable, electronic unit or power supply fails, the pump stops immediately.

Mounting the LiqTec sensor

The LiqTec can be fitted to a DIN rail to be incorporated in a control cabinet.

Functions

- 1. Connection for dry-running sensor**
Service number of dry-running sensor: 96556427.
- 2. Connection for external restarting**
- 3. Motor PTC**
Green light indicates OK or short-circuited terminals.
Red light indicates too high motor temperature.
The alarm relay is activated.
- 4. Connection for PTC sensor**
A PTC sensor according to DIN 44082 can be connected to this terminal.
If the PTC sensor is not used, the terminals must be short-circuited.
- 5. Sensor indicator light**
Red light indicates defective sensor or cable.
The alarm relay is activated.
- 6. Deactivation of the dry-running monitoring function**
Press the button to deactivate the dry-running monitoring function. Red flashing light.
The PTC monitoring function is still active.
Press the Restart button to reactivate the dry-running monitoring function.
- 7. High liquid temperature indicator light**
Red light indicates too high liquid temperature ($130\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$).
The alarm relay is activated.
- 8. Supply voltage**
200-240 V, 50/60 Hz.
- 9. Dry-running indicator light**
Green light indicates OK (liquid in pump).
Red light indicates dry running (no liquid in pump).
The alarm relay is activated.

10. Alarm/run relay output

Potential-free changeover contact.

Maximum contact load:

250 V, 1 A, AC (inductive load).

11. Auto/Man

Changeover between automatic and manual restarting.

The default setting is "Man".

Changeover is carried out by means of a small screwdriver.

When "Auto" has been selected, the alarm indication will automatically be reset 10 to 20 seconds after liquid detection.

12. Restart

Press the button to restart the pump. The button has no influence on the PTC monitoring.

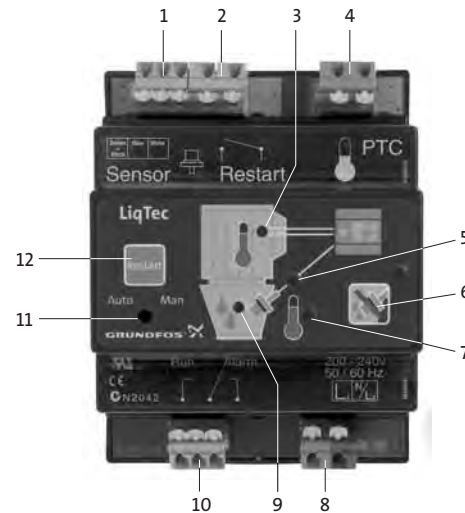


Fig. 9 LiqTec sensor

TM03 0111 4004

Monitoring and protection equipment (GU02)

General

GU02 is a complete monitoring and protection equipment, which can protect the motor from failure caused by motor overheating, high bearing temperature, seal leakage and moisture entry into the junction box.

GU02 can detect:

1. moisture incursion to the junction box
2. overheating of stator windings (U, V, W)
3. high temperature of the bearing (upper and lower)
4. seal leakage.

GU02 can be fitted in an MCC (motor control centre) without the need for a power transformer since it has a built-in voltage-regulating device.

Sensors inside the motor

Sensors that are installed inside the motor are as follows:

1. Thermal protectors in stator windings

For 90 kW (120 Hp) and above, three PT 100 ohm type thermal protection sensors are embedded in each phase of stator windings to monitor the stator winding temperature.

The three thermal protect devices can be connected in parallel (6 wires to connect to GU02) or in series (2 wires to connect).

With MAP, The setting temperature can be easily adjusted without the need for a service technician the recommended temperature setting is 115 °C. or motors 75 kW (100 Hp) and below, one bimetal type thermal protection sensor is installed in stator winding and the inherent setting temperature of the bimetal is 125 °C.

If three bimetal type sensors are required these can be installed as an option. These would be connected in series so there are 2 wires to connect to the MAP.

2. Leakage detector

One electrode type seal leakage sensor is installed on the seal chamber.

If the primary seal leaks and water penetrates into the oil chamber, the resistance of the electrode changes to 20 KΩ.

Under normal conditions, the resistance value of the electrode sensor is greater than 10 MΩ.

3. Bearing temperature detectors

For motors 90 kW (120 HP) and above a lower bearing temperature detector is embedded as standard. An upper bearing sensor can be embedded as an optional extra.

The bearing temperature sensor is platinum transducer type. The controlling temperature of the bearing sensors can be easily adjusted.

4. Moisture sensor in junction box

One electrode type moisture sensor is installed in the junction box to monitor any water entry into the junction box.

In the event that the outer sheath of the cable is damaged, water may enter the junction box by capillary action (wicking), causing a drop the insulation resistance of the motor.

If water enters the junction box, the resistance value of the moisture sensor will drop to 50 KΩ.

Nomenclature

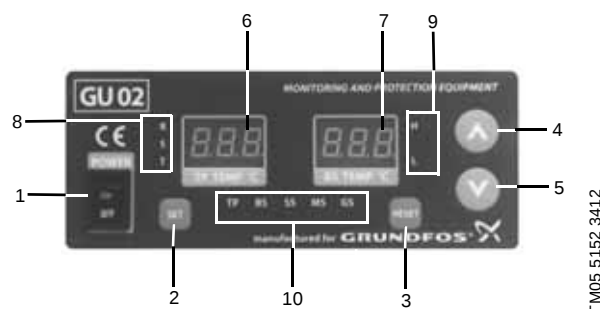


Fig. 10 Front of MAP/GU02

Pos.	Description
1	Power switch
2	Set button
3	Reset button
4	Temperature up
5	Temperature down
6	Stator winding temperature
7	Bearing temperature
8	Phase indication lamp for stator windings: R for U, S for V and T for W
9	Bearing position: H for upper bearing and L for lower bearing.
10	Status indicator lamp

Operating and setup sequence

MAP unit is installed in the MCC (motor control centre) and accordingly MCC manufacturer should prepare the wiring in the panel for MAP accordingly.

Therefore if the panel is not of Grundfos supply, it is strongly recommended to supply one MAP unit to the selected MCC manufacturer is.

The MAP unit is sophisticated and sensitive instrument with many useful functions. Care should be taken to ensure proper handling and connection in accordance with the instructions.

5. Communication

Communication interface module (CIM) / communication interface unit (CIU)



TM05 2193 4511

Fig. 11 CIM/CIU concept from Grundfos

Applications

The Grundfos CIU unit (communication interface unit) is used as a communication interface between a Grundfos product and a main network.

The CIU unit is used together with a CIM module (communication interface module) fitted in the CIU unit.

GENIbus is used for internal communication between the CIU unit and a Grundfos product.

The CIM/CIU concept

For complete control of pump systems, the Grundfos fieldbus concept is the right solution. The newly-developed communication interface module (CIM) and communication interface unit (CIU) enable data communication via open and interoperable networks such as Profibus DP, Modbus RTU, LONWorks, BACnet MS/TP®, GSM/GPRS, or using Grundfos Remote Management.

The series of Grundfos CIM and CIU communication interfaces offer ease of installation and commissioning, user-friendliness and great value for money in the long term. All modules are based on standard functional profiles for an easy integration into the network and easy understanding of data points.

When to use CIM and CIU

CIM modules are add-on modules that allow communication with 11 to 22 kW E-pumps and the new Dedicated Controls for wastewater pumps.

The CIU communication interface unit is for products with a GENIbus interface such as small E-pumps, circulation pumps and boosters. CIU units have an integrated 24 to 240 V power supply and are prepared for wall-mounting or DIN-rail mounting.

The ideal solution

The Grundfos CIM/CIU communication interfaces enable the connection of Grundfos products to standard fieldbus networks, offering substantial benefits:

- complete process control
- one concept for Grundfos products
- modular design prepared for future needs
- based on standard functional profiles
- 24-240 VAC/DC power supply in CIU
- simple configuration and easy to install
- open communication standards.

Integration CD for fast commissioning

With every CIM/CIU communication interface module, Grundfos gives you an integration CD that ensures easy integration into supervisory systems and fast commissioning.

You are provided with functional profiles, documentation and installation files, ready to use.

The CIM/CIU PC Tool with support for Modbus and BACnet are included for easy integration into SCADA systems.

Your Grundfos CIU/CIM communication interface solution can be connected to any SCADA, PLC or Building Management System for communication using the applicable open protocols for wired and wireless communication.

Why Grundfos CIM/CIU modules make good sense

Open and interoperable data bus networks are becoming increasingly important for supervisory systems monitoring pump systems, and Grundfos is committed to open protocols.

You gain an optimal, flexible and therefore cost-effective integration of data communication and field devices such as pumps or pump systems into management systems.

Taking complete control of your pump system in this way offers many advantages. The time spent on reporting, data collection, and so on is minimised as are service visits.

When you always know how your pumps are doing, maintenance visits can be scheduled for maximum efficiency and emergencies reduced to the barest minimum.



TM05 2194 4511

Fig. 12 CIU/CIM for wireless data transfer

Supported products

		External GENibus	LON	Profibus DP	Modbus RTU	GSM/GPRS	BACnet MS/TP	Grundfos Remote Management
	MAGNA UPE	MAGNA: Add-on UPE: Built-in	 CIU 100	 CIU 150	 CIU 200	 CIU 250	 CIU 300	 CIU 271
	MAGNA3	 CIM 050	 CIM 100	 CIM 150	 CIM 200	 CIM 250	 CIM 300	 CIM 270
	0.75 - 11 kW E-pump	Built-in	 CIU 100	 CIU 150	 CIU 200	 CIU 250	 CIU 300	 CIU 271
	11 - 22 kW E-pump	Built-in	 CIM 100	 CIM 150	 CIM 200	 CIM 250	 CIM 300	 CIM 270
	CUE	Built-in	 CIU 100	 CIU 150	 CIU 200	 CIU 250	 CIU 300	 CIU 271
	MPC	Add-on	 CIM 110	 CIM 150	 CIM 200	 CIM 250	 CIM 300	 CIM 271
	Multi-E	Built-in	 CIU 100	 CIU 150	 CIU 200	 CIU 250	 CIU 300	 CIU 271
	MP 204	Built-in	-	 CIU 150	 CIU 200	 CIU 250	-	 CIU 270
	Dedicated Controls	 CIM 050	-	 CIM 150	 CIM 200	 CIM 250	-	 CIM 270
	Sewage AUTO_{ADAPT}	 CIU 902	-	 CIU 152	 CIU 202	 CIU 252	-	 CIU 272
	Multi-B	 CIM 050	 CIM 110	-	 CIM 200	 CIM 250	 CIM 300	 CIM 270
	Digital dosing	Built-in	-	 DDA E-box	-	-	-	-

Communication interface for LON

Easy integration in building automation

The CIM/CIU 100 and CIU 110 are standard interfaces for data transmission between a LON network and a Grundfos pump or controller. It makes data exchange possible between Grundfos pumping systems and a building management system.

The communication interface is fully compliant with the standard LONmark functional profile 8120 "Pump Controller", ensuring interoperability with other LON devices.

The communication interfaces have been certified as conforming to LonMark Application Layer interoperability guidelines 3.4.

The interface module can be installed as an internal add-on or as a wall-mounted unit where internal connection is not supported. The wall-mounted unit is equipped with a 24-240 VAC/VDC power supply.

In addition to LON, interface modules are also available for GENIbus, BACnet, Modbus, Profibus, GSM and other systems.



Fig. 13 CIM/CIU LON option

CIM 100 add-on module

The CIM 100 is an add-on communication module installed internally in 11-22 kW Grundfos E-Pumps. CIM 110 add-on module is used for Hydro Multi-B.

CIU 100 / CIU 110 wall-mounted/DIN-rail unit

The CIU 100 and CIU 110 with internal power supply are for Grundfos products that do not support the add-on module (CIU 110 is used for Hydro MPC/Control MPC).

Supported products

- MAGNA/UPE circulator pumps.*
- Dry-running E-pumps: CRE, CRNE, CRIE, MTRE, CME, TPE Series 1000/2000, NBE, NKE.
- CUE motor drive for pumps.
- Multipump controller: Control MPC.*
- Boosters: Hydro Multi-E, Hydro MPC* and Hydro Multi-B.

* Additional add-on GENIbus module required.

Advantages at a glance

- Supports a wide range of Grundfos products.
- Uses 8120 pump controller functional profile from LONmark.
- Modular design prepared for future needs.
- 24-240 VAC/VDC power supply in CIU.
- Self-documentation strings for fast installation.

Using CIM/CIU with Grundfos products

General CIU 100 / CIU 110 data

Supply voltage	24-240 VAC/VDC, - 10 % / + 15 %
Frequency	0-60 Hz
Power consumption	Max. 11 W
Cable size	IEC: 0.2 - 4 mm ² , UL: 24-12 AWG
Enclosure class	IP54, according to IEC 60529
Cable entry	6 x M16 Ø4 - Ø10
Operating temperatures	-20 °C to +45 °C (-4 °F to +113 °F)
Storage temperatures	-20 °C to +60 °C (-4 °F to +140 °F)
Dimensions (H/W/D)	182 x 108 x 82 mm

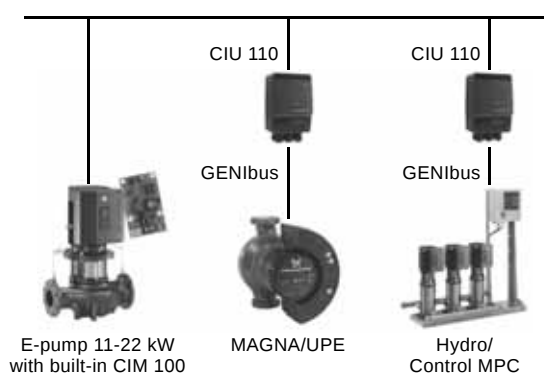
GENIbus communication

Protocol	GENIbus
Recommended cable type	Screened, double twisted-pair
Maximum cable length	1200 m / 4000 ft

LON communication

Transceiver	FTT-10
Protocol	LONtalk
Transmission speeds	78 kbits/s

LON network



TM05 2260 4711

Fig. 14 CIU 100/110 in LON network

Data points

CIM/CIU 100 + CIU 110 LON					
s = Available with sensor. s* = Available with sensor or TPE Series 2000. 1 Differential or absolute depending on the sensor. 2 Not standard for Control MPC.					
	MAGNA/UPE	E-Pumps 0.25 - 7.5 kW	CUE / E-Pumps 11-22 kW	Multi-E	Hydro MPC/ Control MPC
Control					
Operating mode	•	•	•	•	•
Setpoint	•	•	•	•	•
Control mode	•	•	•		•
Status					
Operating mode "Status"	•	•	•	•	•
Control mode "Status"	•	•	•	•	•
Feedback (capacity)	•	•	•	•	•
Alarm and warning information	•	•	•	•	•
Measured data					
Power/energy consumption	•	•	•	•	•
Operating time (run time)	•	•	•	•	•
Pressure (head) ¹	•	s*	s*	•	• ²
Flow rate	•	s*	s*		• ²
Level		s	s		s
Inlet pressure ¹			s		s
Speed	•	•	•		
Liquid temperature	•	s	s		
Remote flow rate			s		
Remote pressure ¹			s		s
Remote temperature			s		
Auxiliary sensor input			s		
Total on time			•		
Outlet pressure ¹					• ²
Temperature difference					s
Inlet and outlet temperatures					s
Ambient temperature					s
Subpump data (for each subpump in the system)					
Status information					•
Alarm information					•
Run time					•
Speed					•

Note: E-Pumps = CRE, CRNE, CME, MTRE, CHIE, TPE Series 1000/2000, NBE, NKE.

Communication interface for Profibus

For automation

The CIM/CIU 150 is a standard interface for data transmission between a Profibus DP network and a Grundfos pump or controller. It makes data exchange possible between Grundfos pumping systems and a PLC or SCADA system.

No custom programming is needed to integrate the CIM/CIU 150 in a Profibus network. System integration is very straight-forward with standard GSD files and support for the standard profile "intelligent pumps" from Profibus International.

The interface module can be installed as an internal add-on or as a wall-mounted unit where internal connection is not supported. The wall-mounted unit is equipped with a 24-240 VAC/VDC power supply.

In addition to Profibus DP, interface modules are also available for GENIbus, BACnet, Modbus, LON, GSM and other systems.



TM05 2261 4711

Fig. 15 CIM/CIU 150 for Profibus

CIM 150 add-on module

The CIM 150 is an add-on communication module installed internally in 11-22 kW Grundfos E-pumps.

CIU 150 wall-mounted/DIN -rail unit

The CIU 150 with internal power supply is for Grundfos products that do not support the add-on module.

Supported products

- MAGNA/UPE circulator pumps.*
- Dry-running E-pumps: CRE, CRNE, CRIE, MTRE, CME, TPE Series 1000/2000, NBE, NKE.
- CUE motor drive for pumps.
- Multipump controller: Control MPC.*
- Motor protector MP 204.
- Boosters: Hydro Multi-E and Hydro MPC.*

* Additional add-on GENIbus module required.

Advantages at a glance

- Supports a wide range of Grundfos products.
- Supports standard intelligent pump profile from Profibus International.
- Modular design prepared for future needs.
- 24-240 VAC/VDC power supply in CIU.
- Easy installation and commissioning.

Using CIM/CIU with Grundfos products

General CIU 150 data

Supply voltage	24-240 VAC/VDC, - 10 % / + 15 %
Frequency	0-60 Hz
Power consumption	Max. 11 W
Cable size	IEC: 0.2 - 4 mm ² , UL: 24-12 AWG
Enclosure class	IP54, according to IEC 60529
Cable entry	6 x M16 Ø4 - Ø10
Operating temperatures	-20 °C to +45 °C (-4 °F to +113 °F)
Storage temperatures	-20 °C to +60 °C (-4 °F to +140 °F)
Dimensions (H/W/D)	182 x 108 x 82 mm

GENIbus communication

Protocol	GENIbus
Recommended cable type	Screened, double twisted-pair
Maximum cable length	1200 m / 4000 ft

Profibus communication

Protocol	Profibus DP
Implementation class	DP-V0
Transmission speeds	9600 bps to 12 Mbps
Slave address	1-126, set via rotary switches

Profibus DP

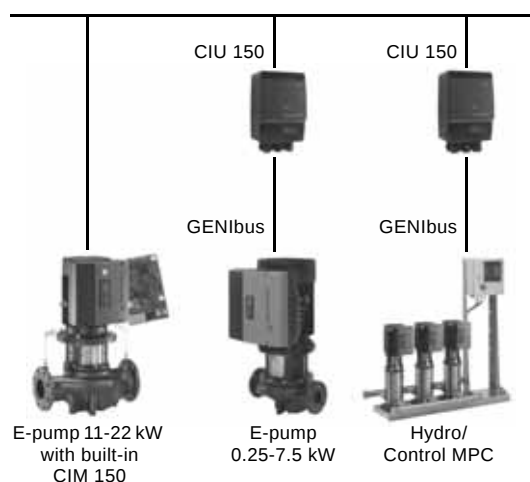


Fig. 16 CIM/CIU 150 in Profibus network

Data points

CIM/CIU 150 Profibus

s = Available with sensor. s* = Available with sensor or TPE Series 2000.							
1 Differential or absolute depending on the sensor.							
2 Not standard for Control MPC.							
3 Not supported for all pump variants.							
	MAGNA/UE	E-Pumps 0.25-7.5 kW	CUE / E-Pumps 11-22 kW	Multi-E	Hydro MPC/ Control MPC	CR Monitor	MP 204
Control							
Operating mode	•	•	•	•	•	•	•
Setpoint	•	•	•	•	•	•	•
Control mode	•	•	•	•	•	•	•
Relay control	•	•	•	•	•	•	•

CIM/CIU 150 Profibus

s = Available with sensor. s* = Available with sensor or TPE Series 2000.							
1 Differential or absolute depending on the sensor.							
2 Not standard for Control MPC.							
3 Not supported for all pump variants.							
	MAGNA/UE	E-Pumps 0.25-7.5 kW	CUE / E-Pumps 11-22 kW	Multi-E	Hydro MPC/ Control MPC	CR Monitor	MP 204

Status

Operating mode "Status"	•	•	•	•	•	•	•
Control mode "Status"	•	•	•	•	•	•	•
Feedback	•	•	•	•	•	•	•
Alarm and warning information	•	•	•	•	•	•	•
Bearing service information	•	•	•	•	•	•	•

Measured data

Power/energy consumption	•	•	•	•	•	•	•
Pressure (head) ¹	•	s*	s*	•	• ²	•	•
Flow rate	•	s*	s*	•	• ²	•	•
Relative performance	•	•	•	•	•	•	•
Speed and frequency	•	•	•	•	•	•	•
Digital input/output	•	•	•	•	•	•	•
Motor current	•	•	•	•	•	•	•
DC link voltage	•	•	•	•	•	•	•
Motor voltage	•	•	•	•	•	•	•
Remote flow rate	•	•	s	•	•	•	•
Inlet pressure ¹	•	•	s	•	s	s	•
Remote pressure ¹	•	•	s	•	s	•	•
Level	•	s	s	•	s	•	•
Motor temperature	•	•	•	•	•	• ³	s
Remote temperature	•	s	s	•	s	•	•
Liquid temperature	•	•	s	•	•	s	•
Bearing temperatures	•	•	s	•	•	•	•
Auxiliary sensor input	•	s	s	•	•	s	•
Operating time (run time)	•	•	•	•	•	•	•
Total on time	•	•	•	•	•	•	•
Torque (n/a on 1-phase motors)	•	•	•	•	•	•	•
Number of starts	•	•	•	•	•	•	•
Ambient temperature	•	•	•	•	s	•	•
Inlet and outlet temperatures	•	•	•	•	s	•	•
Temperature difference	•	•	•	•	s	•	•
Outlet pressure ¹	•	•	•	•	• ²	s	•
Feed tank level	•	•	•	•	s	•	•
Phase voltages	•	•	•	•	•	•	•
Line voltages, currents, frequency	•	•	•	•	•	•	•
Start/run capacitor	•	•	•	•	•	•	•
Voltage angles + cos phi	•	•	•	•	•	•	•
Insulation resistance	•	•	•	•	•	•	•
Starts/h and auto restarts/24h	•	•	•	•	•	•	•
Calculated/measured efficiency	•	•	•	•	•	•	•
Available/required NPSH	•	•	•	•	•	•	•
Cavitation margin	•	•	•	•	•	•	•

Subpump data (for each subpump in the system)

Status information	•	•	•	•	•	•	•
Alarm information	•	•	•	•	•	•	•
Operating time (run time)	•	•	•	•	•	•	•
Speed	•	•	•	•	•	•	•

Note: E-Pumps = CRE, CRNE, CME, MTR, CHIE, TPE Series 1000/2000, NBE, NKE.

Communication interface for Modbus

For automation

The CIM/CIU 200 is a standard interface for data transmission between a Modbus RTU network and a Grundfos pump or controller. It makes data exchange possible between Grundfos pumping systems and a PLC or SCADA system.

Extensive amounts of data points are available from each product via the CIM/CIU 200. The interface offers uncomplicated system integration with both new and legacy systems, as the Modbus RTU protocol is widely supported by existing control systems and PLCs.

The interface module can be installed as an internal add-on or as a wall-mounted unit where internal connection is not supported. The wall-mounted unit is equipped with a 24-240 VAC/VDC power supply.

In addition to Modbus, interface modules are also available for GENIbus, BACnet, Profibus, LON, GSM/GPRS (wireless communication) and other systems.



TM05 2263 4711

Fig. 17 CIM/CIU 200 for Modbus option

CIM 200 add-on module

The CIM 200 is an add-on communication module installed internally in 11-22 kW Grundfos E-pumps or Dedicated Controls or Hydro Multi-B.

CIU 200 wall-mounted/DIN-rail unit

The CIU 200 with internal power supply is for Grundfos products that do not support the add-on module.

Supported products

- Dry-running E-pumps: CRE, CRNE, CRIE, MTRE, CME, TPE Series 1000/2000, NBE, NKE.
- MAGNA/UPE circulator pumps.*
- CUE motor drive for pumps.
- Multipump Controller: Control MPC.*
- Boosters: Hydro Multi-E, Hydro MPC* and Hydro Multi-B.
- CR Monitor: condition monitoring for CR pumps.*
- Dedicated Controls for sewage pumps (separate data sheet).
- Motor protector MP 204.

* Additional add-on GENIbus module required.

Advantages at a glance

- Supports a wide range of Grundfos products.
- Simple configuration of Modbus RTU hardware settings.
- Modular design prepared for future needs.
- 24-240 VAC/VDC power supply in CIU.
- Modbus diagnostics available.
- Transmission speeds up to 38.4 kbs.

Using CIM/CIU with Grundfos products

General CIU 200 data

Supply voltage	24-240 VAC/VDC, - 10 % / + 15 %
Frequency	0-60 Hz
Power consumption	Max. 11 W
Cable size	IEC: 0.2 - 4 mm ² , UL: 24-12 AWG
Enclosure class	IP54, according to IEC 60529
Cable entry	6 x M16 Ø4 - Ø10
Operating temperatures	-20 °C to +45 °C (-4 °F to +113 °F)
Storage temperatures	-20 °C to +60 °C (-4 °F to +140 °F)
Dimensions (H/W/D)	182 x 108 x 82 mm

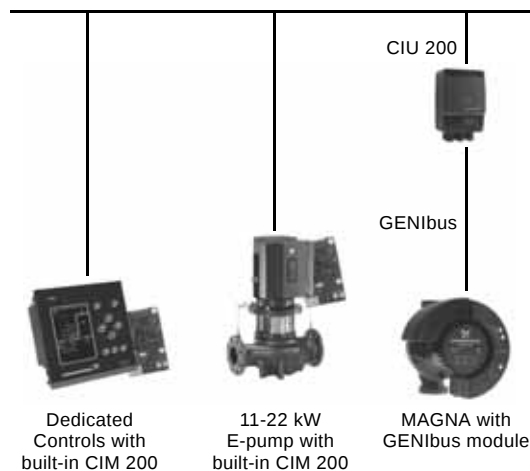
GENIbus communication

Protocol	GENIbus
Recommended cable type	Screened, double twisted-pair
Maximum cable length	1200 m / 4000 ft

Modbus communication

Protocol	Modbus RTU
Transceiver	RS-485
Transmission speed	1.2, 2.4, 4.8, 9.6, 19.2, 38.4 kbits/s
Parity settings	Even or no parity
Modbus slave address	1-247, set via rotary switches

Modbus RTU network



TM05 2264 4612

Fig. 18 CIM/CIU 200 in Modbus network

Data points

CIM/CIU 200 Modbus							
s = Available with sensor. s* = Available with sensor or TPE Series 2000. 1 Differential or absolute depending on the sensor. 2 Not standard for Control MPC. 3 Not supported for all pump variants.							
	MAGNA/UE	E-Pumps 0.25-7.5 kW	CUE / E-Pumps 11-22 kW	Multi-E	Hydro MPC/ Control MPC	MP 204	CR Monitor
Control							
Operating mode	•	•	•	•	•	•	•
Setpoint	•	•	•	•	•	•	•
Control mode	•	•	•	•	•	•	•
Relay control	•	•	•	•	•	•	•

CIM/CIU 200 Modbus

s = Available with sensor. s* = Available with sensor or TPE Series 2000.							
1 Differential or absolute depending on the sensor.							
2 Not standard for Control MPC.							
3 Not supported for all pump variants.							
	MAGNA/UE	E-Pumps 0.25-7.5 kW	CUE / E-Pumps 11-22 kW	Multi-E	Hydro MPC/ Control MPC	MP 204	CR Monitor

Status

Operating mode "Status"	•	•	•	•	•	•	•
Control mode "Status"	•	•	•	•	•	•	•
Feedback	•	•	•	•	•	•	•
Alarm and warning information	•	•	•	•	•	•	•
Bearing service information	•	•	•	•	•	•	•

Measured data

Power/energy consumption	•	•	•	•	•	•	•
Pressure (head) ¹	•	s*	s*	•	• ²	•	•
Flow rate	•	s*	s*	•	• ²	•	•
Relative performance	•	•	•	•	•	•	•
Speed and frequency	•	•	•	•	•	•	•
Digital input/output	•	•	•	•	•	•	•
Motor current	•	•	•	•	•	•	•
DC link voltage	•	•	•	•	•	•	•
Motor voltage	•	•	•	•	•	•	•
Remote flow rate	•	•	s	•	•	•	•
Inlet pressure ¹	•	•	s	•	s	•	s
Remote pressure ¹	•	•	s	•	s	•	s
Level	•	s	s	•	s	•	s
Motor temperature	•	•	•	•	•	s	• ³
Remote temperature	•	s	s	•	s	•	•
Liquid temperature	•	•	s	•	•	•	s
Bearing temperatures	•	•	s	•	•	•	•
Auxiliary sensor input	•	s	s	•	•	•	s
Operating time (run time)	•	•	•	•	•	•	•
Total on time	•	•	•	•	•	•	•
Number of starts	•	•	•	•	•	•	•
Ambient temperature	•	•	•	•	s	•	•
Inlet and outlet temperatures	•	•	•	•	s	•	•
Temperature difference	•	•	•	•	s	•	•
Outlet pressure ¹	•	•	•	•	• ²	•	s
Feed tank level	•	•	•	•	s	•	•
Phase voltages	•	•	•	•	•	•	•
Line voltages, currents, frequency	•	•	•	•	•	•	•
Start/run capacitor	•	•	•	•	•	•	•
Voltages angles + cos phi	•	•	•	•	•	•	•
Insulation resistance	•	•	•	•	•	•	•
Starts/h and auto restarts/24h	•	•	•	•	•	•	•
Calculated/measured Efficiency	•	•	•	•	•	•	•
Available/required NPSH	•	•	•	•	•	•	•
Cavitation margin	•	•	•	•	•	•	•

Subpump data (for each subpump in the system)

Status information	•	•	•	•	•	•	•
Alarm information	•	•	•	•	•	•	•
Operating time (run time)	•	•	•	•	•	•	•
Speed	•	•	•	•	•	•	•

Note: E-Pumps = CRE, CRNE, CME, MTRE, CHIE, TPE Series 1000/2000, NBE, NKE.

Communication interface for GSM/GPRS

For remote wireless control and monitoring

The CIM/CIU 250 is a standard interface for data transmission between a GSM/GPRS network and a Grundfos pump or controller and can be used as follows:

- As an SMS interface it enables users to control and monitor Grundfos pumps and pump systems from a mobile phone. It is possible to get a message whenever a warning or an alarm occurs, to request the status or to do simple control like START, STOP and adjusting of setpoint.
- The GSM/GPRS module can work as a SCADA Interface enabling a SCADA system or a PLC controller to establish a remote connection either via GSM Call-up using the Modbus RTU protocol or via a GPRS using the Modbus TCP protocol connection.

Extensive amounts of data points are available from each product via the CIM/CIU 250. The interface offers uncomplicated wireless data transmission and remote control of Grundfos pumps systems. The interface module can be installed as an internal add-on or as a wall-mounted unit where internal connection is not supported. The wall-mounted unit is equipped with a 24-240 VAC/VDC power supply. In addition to GSM/GPRS, Grundfos CIM/CIU interface modules are also available for the wired fieldbuses GENIbus, BACnet, Profibus, LON and Modbus.



Fig. 19 CIM/CIU 250 for wireless network

CIM 250 add-on-module

The CIM 250 is an add-on communication module installed internally in 11-22 kW Grundfos E-Pumps or Dedicated Controls or Hydro Multi-B.

CIU 250 wall-mounted/DIN-rail unit

The CIU 250 with internal power supply is for Grundfos products that do not support the add-on module.

Supported products

- Dry-running E-pumps: CRE, CRNE, CRIE, MTRE, CHIE, CME, TPE Series 1000/2000, NBE, NKE.
- CUE motor drive for pumps.
- Multipump controller: Control MPC.*
- Boosters: Hydro Multi-E, Hydro MPC* and Hydro Multi-B.
- CR Monitor: condition monitoring for CR pumps.*
- Dedicated Controls for sewage pumps (separate data sheet).
- Motor protector MP 204.
- MAGNA/UPE circulator pumps.*
- Sewage AUTO_{ADAPT} pump (separate data sheet).

* Additional add-on GENIbus module required.

Advantages at a glance

- Supports a wide range of Grundfos products.
- Simple configuration via SMS commands.
- Modular design.
- 24-240 VAC/VDC power supply in CIU.
- Wireless remote control and monitoring.
- Status request and control via SMS.
- GSM call-up.
- GPRS connection.
- Built-in battery backup possible.

Using CIM/CIU with Grundfos products

General CIU 250 data

Supply voltage	24-240 VAC/VDC, - 10 % / + 15 %
Frequency	0-60 Hz
Power consumption	Max. 11 W
Cable size	IEC: 0.2 - 4 mm ² , UL: 24-12 AWG
Enclosure class	IP54, according to IEC 60529
Cable entry	6 x M16 Ø4 - Ø10
Operating temperatures	-20 °C to +45 °C (-4 °F to +113 °F)
Storage temperatures	-20 °C to +60 °C (-4 °F to +140 °F)
Dimensions (H/W/D)	182 x 108 x 82 mm

GENIBus communication (CIU 250)

Protocol	GENIBus
Recommended cable type	Screened, double twisted-pair
Maximum cable length	1200 m / 4000 ft

GSM/GPRS communication

Protocol	SMS GSM call up (Modbus RTU) GPRS (Modbus TCP)
GSM antenna	Available as an option
Battery	Included with CIU 250 Optional for CIM 250
SIM card	To be supplied by user/installer

SMS features

Read product status	E.g. pressure, power, temperature etc. (depends on product type) Request active alarms/warnings
Read network status	E.g. signal level, battery status, GSM/GPRS status and data statistics.
Get messages	Alarm/warning messages Heart beat messages
Control	Set operating mode (e.g. start/stop) Set control mode (e.g. constant pressure) Set setpoint Reset alarms
Configuration	SMS access control via PIN code Configuration of SMS functions Configuration of GSM options Configuration of GPRS connection

Data points

CIM 250 GSM/GPRS

s = Available with sensor. s* = Available with sensor or TPE Series 2000.							
1 Differential or absolute depending on the sensor.							
2 Not standard for Control MPC.							
3 Not supported for all pump variants.							
	MAGNA/UE	E-Pumps 0.25-7.5 kW	CUE / E-Pumps 11-22 kW	Hydro Multi-E	Hydro MPC/ Control MPC	MP 204	CR Monitor
Control							
Operating mode	•	•	•	•	•	•	•
Setpoint	•	•	•	•	•	•	•
Control mode	•	•	•	•	•	•	•
Relay control	•	•	•	•	•	•	•

CIM 250 GSM/GPRS

s = Available with sensor. s* = Available with sensor or TPE Series 2000.							
1 Differential or absolute depending on the sensor.							
2 Not standard for Control MPC.							
3 Not supported for all pump variants.							
	MAGNA/UE	E-Pumps 0.25-7.5 kW	CUE / E-Pumps 11-22 kW	Hydro Multi-E	Hydro MPC/ Control MPC	MP 204	CR Monitor

Status

Operating mode "Status"	•	•	•	•	•	•	•
Control mode "Status"	•	•	•	•	•	•	•
Feedback	•	•	•	•	•	•	•
Alarm and warning information	•	•	•	•	•	•	•
Bearing service information	•	•	•	•	•	•	•

Measured data

Power/energy consumption	•	•	•	•	•	•	•
Pressure (head) ¹	•	s*	s*	•	• ²	•	•
Flow rate	•	s*	s*	•	• ²	•	•
Relative performance	•	•	•	•	•	•	•
Speed and frequency	•	•	•	•	•	•	•
Digital input/output	•	•	•	•	•	•	•
Motor current	•	•	•	•	•	•	•
DC link voltage	•	•	•	•	•	•	•
Motor voltage	•	•	•	•	•	•	•
Remote flow rate	•	•	s	•	•	•	•
Inlet pressure ¹	•	•	s	•	s	•	s
Remote pressure ¹	•	s	s	•	s	•	s
Level	•	s	s	•	s	•	s
Motor temperature	•	•	•	•	•	s	• ³
Remote temperature	•	s	s	•	s	•	•
Liquid temperature	•	•	s	•	•	•	s
Bearing temperatures	•	•	s	•	•	•	•
Auxiliary sensor input	•	s	s	•	•	•	s
Operating time (run time)	•	•	•	•	•	•	•
Total on time	•	•	•	•	•	•	•
Number of starts	•	•	•	•	•	•	•
Ambient temperature	•	•	•	•	s	•	•
Inlet and outlet temperatures	•	•	•	•	s	•	•
Temperature difference	•	•	•	•	s	•	•
Outlet pressure ¹	•	•	•	•	• ²	•	s
Feed tank level	•	•	•	•	s	•	•
Phase voltages	•	•	•	•	•	•	•
Line voltages, currents, frequency	•	•	•	•	•	•	•
Start/run capacitor	•	•	•	•	•	•	•
Voltages angles + cos phi	•	•	•	•	•	•	•
Insulation resistance	•	•	•	•	•	•	•
Starts/h and auto restarts/24h	•	•	•	•	•	•	•
Calculated/measured Efficiency	•	•	•	•	•	•	•
Available/required NPSH	•	•	•	•	•	•	•
Cavitation margin	•	•	•	•	•	•	•

Subpump data

Status information	•	•	•	•	•	•	•
Alarm information	•	•	•	•	•	•	•
Operating time (run time)	•	•	•	•	•	•	•
Speed	•	•	•	•	•	•	•

Note: E-Pumps = CRE, CRNE, CME, MTR, CHIE, TPE Series 1000/2000, NBE, NKE.

Grundfos Remote Management

Internet-based remote management system

Bring all your pumps online

With this secure and reliable remote management system, you can monitor and manage your pump systems from an Internet PC at a very low price.

Grundfos Remote Management is a cost-effective and straightforward way to monitor and manage pump installations in commercial buildings and in water supply and wastewater infrastructure. It reduces the need for on-site inspections, and in the event of an alarm or warning, the relevant people are notified directly.

Compared to mobile phone based monitoring, the system offers a wider range of benefits and functionalities. For those who do not require remote process automation, Grundfos Remote Management is the ideal solution for monitoring and remote control as opposed to traditional SCADA systems. Initial investment is minimal, and a fixed low fee covers data traffic, hosting costs and system support, including back-up of all data.

The CIU271 communication interface enables data transmission via GPRS / SMS from your Grundfos pumps and controllers. The built-in multi-purpose I/O board allows you to connect sensors and switches.



TM05 2325 4911

Fig. 20 GRM for web monitoring and SMS



TM05 2326 4911

Fig. 21 CIU 270 box for GRM communication

Be the first to know

Easy and cost-effective monitoring and management of critical installations. If anything needs attention, you will be the first to know.

Wastewater pumping stations

Monitor standard wastewater pumps, sensors and controllers of any make and model, including automatic reports of operational data.

Water treatment plants

Monitor flow and pressure sensors, tank levels, pumps and security alarms, including automatic reports of power consumption and operational data.

Mines and construction sites

Receive alarms from dewatering pumps immediately in the critical event of breakdown or malfunction.

Irrigation

Monitor tank levels, pressure gauges and pumps to be sure crops and livestock always have enough water.

Building installations

HVAC, fire protection units and pressure boosters are monitored and managed from a central location, ensuring and documenting services to building users.

A precise picture

A full overview of the operation, performance and trends.

Complete overview

See the status of your entire system on your own map or aerial photo.



TM05 2508 0112

Online with your pumps

Live monitoring, analysis and adjustments from the comfort of your office.



TM05 2509 0112

Monitor energy consumption

Trends and reports may reveal opportunities to reduce energy consumption and optimise system performance.



TM05 2510 0112

Share documentation

Upload system documentation to a secure server and make it accessible to all relevant personnel.



TM05 2511 0112

Flexible on-call schedule

Simple planning of who responds to alarms in rotating weekly schedules.



TM05 2512 0112

Manage service and maintenance

Plan service work on the basis of actual operating data and get notification when service is due.



TM05 2513 0112

Top security and full IT-support

Grundfos Remote Management is internet-based, and a fixed low fee covers data traffic, hosting and full IT support. Given the critical nature of the services provided, the integrity of the system and your data is a top priority.

Enterprise-class hosting and support is provided by Grundfos' IT organisation, using the same data centres as our own business-critical systems for production, sales and service organisations. With so much at stake, the infrastructure is set up in two independent data centres reflecting the aim of eliminating single points of failure. Redundancy is assured for the server, network and power supply as well as data storage and back-up. The system is monitored 24/7.

This level of security is directly available when using Grundfos Remote Management. All your people need is Internet access, a standard browser and a password.

Communication interface for GSM/GPRS for Dedicated Controls and sewage AUTO_{ADAPT}

For remote wireless automation, control and monitoring

The CIM 250 is a standard interface module for remote wireless data transmission via a GSM/GPRS network and can be used as follows:

- As an SMS interface it enables users to control and monitor Grundfos AUTO_{ADAPT} pumps and the Grundfos Dedicated Controls sewage controller from a mobile phone. It is possible to get a message whenever a warning or an alarm occurs, to request the status or to do simple control like START, STOP and adjusting of setpoint.
- The GSM/GPRS module can work as a SCADA Interface enabling a SCADA system or another PLC controller to establish a remote connection either via GSM Call-up using the Modbus RTU protocol or via a GPRS connection using the Modbus TCP protocol with the system.

Extensive amounts of data points are available from the system, when connected via the CIM 250. The interface offers uncomplicated wireless data transmission and remote control of pumping stations and commercial buildings. The interface module is installed as an internal add-on for Dedicated Controls. In addition to CIM 250 GSM/GPRS, interface fieldbus modules are also available for GENIbus and Modbus RTU using a wired RS485 connection.

CIM 250 add-on module

The CIM 250 is an add-on communication module installed internally in Dedicated Control. The CIU 252 module, with integrated power supply supports the sewage AUTO_{ADAPT} pumps.

Advantages at a glance

- Simple configuration of CIM 250 via Dedicated Controls display
- Modular design
- Wireless remote control and monitoring
- Incoming/outgoing pit interlock function
- Status request and control via SMS
- GSM call-up and call-back
- GPRS connection with call-back option
- Built-in battery backup possible
- External GSM antenna option



Fig. 22 CIM/CIU 250 and 252 hardware

Using CIM 250 with Dedicated Controls and for sewage AUTO_{ADAPT}

GSM/GPRS communication

Protocol	SMS GSM call up/call-back (Modbus RTU) GPRS (Modbus TCP) with call-back option
GSM antenna	Available as an option
Battery	Available as an option
SIM card	To be supplied by user/installer

SMS features

Read status	Main status of pump pit and pumps Request active alarms/warnings
Get messages	Alarm/warning messages Heart beat messages
Control	Interlock (stop) the pump pit Acknowledge alarms/warnings Reset alarms Operate user-defined relay (on/off)
Configuration	Functions SMS access control option (PIN code, phone number) Phone book with duty roster

Data points

CIM 250 GSM/GPRS

¹ Available for today, yesterday and totally.

	Dedicated Controls	Sewage AUTO _{ADAPT}
Pit control		
Reset alarm	•	•
Interlock pit	•	
Custom relay control (On/Off/Pulse)	•	
Pump control		
Pumps On/Off/Auto	•	•
Pump down		•
Configuration		
Set pit and pumps control levels	•	•
Pit status		
Pit operation mode	•	•
Active alarms/warnings	•	•
Pit mode (single/multi)		•
Status/function of float switches	•	
Presence of sensors	•	
Real time clock (read and set)	•	
Pit control source (Manual/Auto)	•	•
Pit and pumps control levels	•	•
Water level	•	•
Water level max		•
In/out flow	•	
Power/energy consumption	• ¹	• ¹
Specific energy	•	
Volume	• ¹	
Overflow volume/time/counter	• ¹	
Operating time	•	•
Operating time for simultaneous pumps	• ¹	•
Mixer average starts per hours	•	
3 user-defined sensor inputs	•	
Float switches	•	
Digital inputs		•
8 I/O logic outputs	•	
Pump status		
Presence of pump	•	•
Pump enabled/disabled	•	
Running/stopped	•	•
Active alarms/warnings	•	•
Auxiliary equipment status	•	
Control source	•	
Operating time	• ¹	• ¹
Starts counter (total/average)	• ¹	• ¹
Latest continuous operating time	•	•
Max. continuous operating time		•
Time to service	•	
Flow (actual/latest)	•	
Current (actual/latest)	•	•
Voltage/frequency	•	•
Current asymmetry	•	
Power, power factor, energy consumption	•	•
Motor temperature	•	•
Insulation	•	
Water in oil	•	
Special		
Hour log (latest 72h of main pit/pump values)	•	
Event log (50 latest alarms/warnings w. time stamp)	•	
User-defined data log (40000 registers)	•	

Communication interface for BACnet MS/TP

For building automation

The CIM/CIU 300 is a standard interface for data transmission between a BACnet MS/TP network and a Grundfos pump. It makes data exchange possible between pumps and a SCADA system or supervisory controller.

The communication interface is based on standard BACnet object types, allowing for straight forward data access over the network.

The BACnet functional profile has been optimised for exchanging data between pumping systems and building management systems / operator workstations.

The interface module can be installed as an internal add-on or as a wall-mounted unit where internal connection is not supported. The wall-mounted unit is equipped with a 24-240 VAC/VDC power supply.

In addition to BACnet, interface modules are also available for GENIbus, LON, Modbus, Profibus, GSM/GPRS (wireless communication) and other systems.



TM05 2265 4711

Fig. 23 CIM/CIU 300 for BACnet communication

CIM 300 add-on module

The CIM 300 is an add-on communication module installed internally in 11-22 kW Grundfos E-pumps and Hydro Multi-B.

CIU 300 wall-mounted/DIN-rail unit

The CIU 300 with internal power supply is for Grundfos products that do not support the add-on module.

Product support list

- MAGNA/UPE circulator pumps.*
- Dry-running E-pumps: CRE, CRNE, CRIE, MTRE, CME, TPE Series 1000/2000, NBE, NKE.
- CUE motor drive for pumps.
- Multipump controller: Control MPC.*
- Boosters Hydro Multi-E, Hydro MPC * and Hydro Multi-B.

* Additional add-on GENIbus module required.

Advantages at a glance

- Supports a wide range of Grundfos products.
- Simple configuration of BACnet MS/TP network settings.
- Modular design based on open standards.
- 24-240 VAC/VDC power supply in CIU.
- Supports automatic device recognition on BACnet network.
- Transmission speeds up to 76.8 kbit/s.

Using CIM/CIU with Grundfos products

General CIU 300 data

Supply voltage	24-240 VAC/VDC, - 10 % / + 15 %
Frequency	0-60 Hz
Power consumption	Max. 11 W
Cable size	IEC: 0.2 - 4 mm ² , UL: 24-12 AWG
Enclosure class	IP54, according to IEC 60529
Cable entry	6 x M16 Ø4 - Ø10
Operating temperatures	-20 °C to +45 °C (-4 °F to +113 °F)
Storage temperatures	-20 °C to +60 °C (-4 °F to +140 °F)
Dimensions (H/W/D)	182 x 108 x 82 mm

GENIbus communication

Protocol	GENIbus
Recommended cable type	Screened, double twisted-pair
Maximum cable length	1200 m / 4000 ft

BACnet communication

Transceiver	RS-485
Protocol	BACnet MS/TP (Master)
Transmission speeds	9.6, 19.2, 38.4, 76.8 kbits/s
BACnet master address	1-127

BACnet network

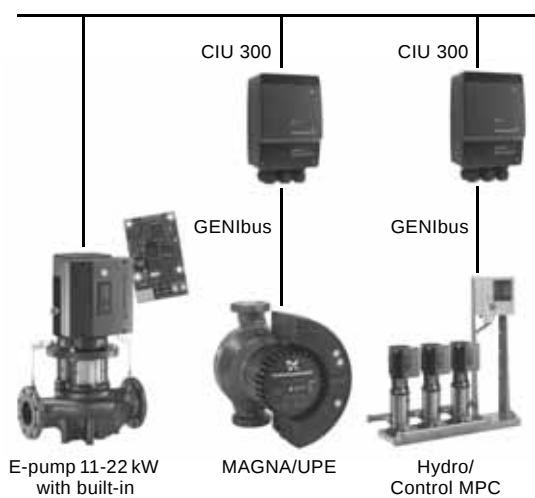


Fig. 24 CIM/CIU 300 in BACnet network

TM05 2266 4711

Data points

CIM 300 BACnet

s = Available with sensor.

s* = Available with sensor or TPE Series 2000.

¹ Differential or absolute depending on the sensor.

² Not standard for Control MPC.

	MAGNA/UPE	E-Pumps 0.25-7.5 kW	CUE / E-Pumps 11-22 kW	Multi-E	Hydro MPC/ Control MPC
Control					
Operating mode	•	•	•	•	•
Setpoint	•	•	•	•	•
Control mode	•	•	•		•
Relay control		•	•		

Status

Operating mode "Status"	•	•	•	•	•
Control mode "Status"	•	•	•	•	•
Feedback	•	•	•	•	•
Alarm and warning information	•	•	•	•	•
Bearing service information			•		

Measured data

Power/energy consumption	•	•	•	•	•
Pressure (head) ¹	•	s*	s*	•	• ²
Flow rate**	•	s*	s*		• ²
Relative performance	•	•	•	•	•
Speed and frequency	•	•	•		
Digital input/output		•	•		•
Motor current		•	•	•	
Motor voltage		•	•		
Remote flow rate			s		
Inlet pressure ¹			s		s
Remote pressure ¹			s		s
Level		s	s		s
Motor temperature			•		
Remote temperature		s	s		s
Liquid temperature	•		s		
Bearing temperatures			s		
Auxiliary sensor Input		s	s		
Operating time (run time)	•	•	•	•	•
Total on time	•	•	•	•	
Number of starts		•	•		
Volume (CUE only)			s		
Ambient temperature					s
Inlet and outlet temperatures					s
Temperature difference					s
Outlet pressure ¹					s
Feed tank level					s

Subpump data

Status information				•	•
Alarm information				•	•
Operating time (run time)				•	•
Speed					•

Note: E-Pumps = CRE, CRNE, CME, MTRE, CHIE, TPE Series 1000/2000, NBE, NKE.

** Estimated flow can be used for monitoring purposes only, but it is not recommend for controlling purposes.

Grundfos GO



TM05 5158 3412

Fig. 25 Grundfos GO

Grundfos GO gives you intuitive handheld pump control and full access to the Grundfos online tools on the go. So get ready to save valuable time on pump control, reporting and data collection with the most comprehensive mobile platform on the market.



TM05 5159 3412

Fig. 26 Hardware accessories for Grundfos GO

Full control

Grundfos GO gives you complete control over every aspect of pump performance, whether you are dealing with one or more pumps at a time. Now, you can monitor all relevant pump data, group pumps for increased manageability, change settings and much more.

More information and assistance

The user-friendly Grundfos GO interface gives you all the information and help you will ever need. Grundfos GO works with all our e-pumps and communicates both via radio and infra-red technology. It provides easy to-follow tips and guidance as well as live pump data feeds (duty point, power consumption, speed, temperature etc.). Even the alarm log system has been designed to make error codes fully descriptive and intuitive.

More connected

With Grundfos GO, you will never be out of touch. You get quick-links to all relevant documentation and full integration with our easy online sizing and replacement tools around the clock. And since your Grundfos GO application will be updated with new features and functions in the future, you will always be at the forefront of mobile pump technology.

More timesaving

Grundfos GO has been designed to save you time and effort. The built-in PDF generator stores your pump reports (documenting your pump configurations) and important notes safely in an easy-to-share format that saves you the trouble of dealing with pen, paper and printouts. In larger systems you can install or reconfigure groups of pumps easily and quickly with the Clone Pump Settings function.

Choose your hardware



Fig. 27 IR dongle for iPhone

My own smartphone

If you already have a smartphone, simply order the appropriate dongle (Grundfos mobile interface) from Grundfos and download the free Grundfos GO application available on the App Store or Android Market.

Something I can share with colleagues

If you prefer a ready-to-use solution, we can also provide an iPod touch complete with dongle (Grundfos mobile interface) and pre-installed Grundfos GO application in a convenient cover.

TM05 5160 3412

Compatibility



TM05 5162 3412

Fig. 28 Complete overview of the application.

Grundfos GO is backwards compatible with Grundfos e-pumps and will communicate with the following Grundfos products:

Pumps

- MAGNA
- SEG (AUTO_{ADAPT})
- UPE, UPS
- CRE, CRIE, CRNE
- MTRE, SPKE, CRKE
- TPE, TPED
- NKE, NBE
- Multi-E, CME

Control boxes

- CU 300
- CU 301
- IO 351
- MP 204

6. Sensors

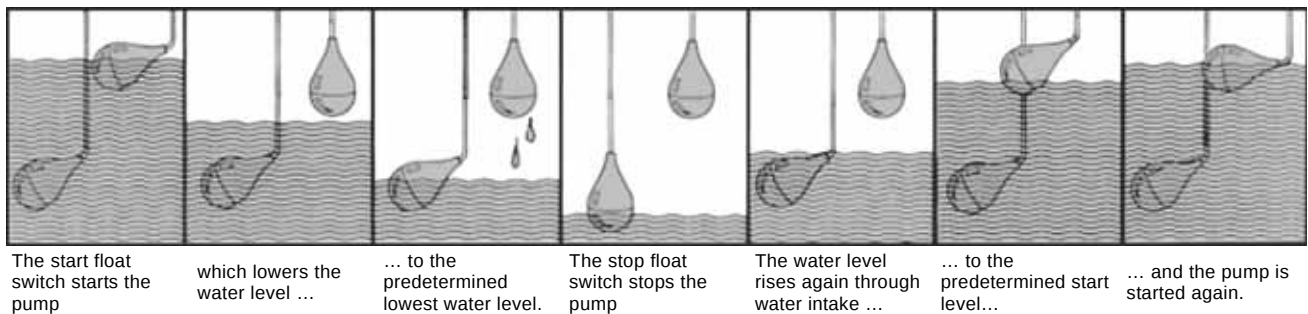
Float switches, type MS

The float switch is freely suspended from a highly flexible heavy-duty cable and set at the required level for "on", "off" and "alarm".

The position of the float switch changes with the water level. A microswitch opens and closes the circuit, for example, switching a pump on or off or triggering an alarm.

One float switch is required for each switching impulse.

The float switch is, however, equipped with a changeover contact, that is, depending on the electrical connection, the float switch can be used both to empty and fill a tank.

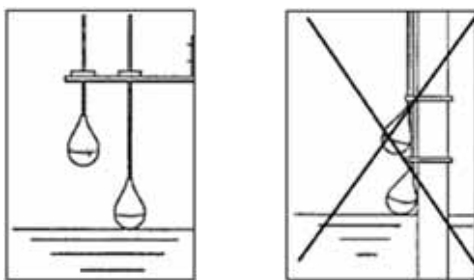


Installation

Make sure that the float switches can hang freely, that they do not rest on the base, that they can float without interference from the shaft walls, pipes, and fittings etc., and that they are not in direct current.

We offer a cable support for simple mounting. The stainless steel support is mounted on the wall.

By means of this support, two float switches can be suspended at the required height by means of cable screw-joints.

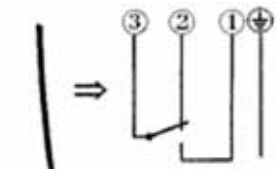
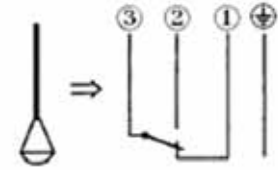


TM05 2717 0412 - TM05 2718 0412

Fig. 29 Float switches mounted by means of a cable support

Electrical connection

The electrical connection of the float switch takes normally place on a low voltage control circuit by a control unit. It may not operate directly on an electrical supply line, e.g. not directly on a pump motor.

Connection of float switch		(1) grey	(2) black	(3) brown
	For emptying a tank	insulate	X	X
	Alarm high level	insulate	X	X
	For filling a tank	X	insulate	X
	Alarm low level	X	insulate	X

If correct installed and mounted, the float switch function is practically maintenance-free.

Depending on the medium's pollution level, the installation must be checked for dirt deposits from time to time and cleaned if necessary.

Product data

	MS1	MS1 elec. Ex	MS1 C
			
	TM05 2721 0412	TM05 2722 0412	TM05 2723 0412
Specific density (in liquid)	0.95 - 1.05	0.95 - 1.05	0.95 - 1.05
Breaking capacity	1 mA/4 V - 5 A/250 V	1-100 mA 4-40 V	1 mA/4 V - 5 A/250 V
Max. temperature	80 °C	80 °C	100 °C
Protect system	IP68 / 2 bar	IP68 / 2 bar	IP68 / 2 bar
Angle function	10 °	10 °	10 °
EX classification		II 1G EEx ia IIC T6	
Housing material	Polypropylene	Polypropylene Pre-elec.	Polypropylene Stamylen
Cable material	TPK/PVC	TPK/PVC	Teflon FEP
Housing colour	Orange	Black	Grey
Cable colour	Orange	Dark blue	Black
Height [mm]	180	180	180
Diameter [mm]	100	100	100
Cable cross-section [mm]	3 x 0.75	3 x 0.75	3 x 0.75

Resistance list

MS1 / MS1 elec. Ex	MS1 C
Sewage	Accumulator acid
Faecal water	Fuel
Liquid manure	Oil bore / turbine / engine / lube
Domestic sewage	Oil gear / fuel / diesel / transformer
Sewage of washing machine	Degreaser
Bathes and showers	ATE brake fluid
Suds	Petroleum
Emulsion with parts of diesel oil / grease / oil / acids etc.	Non-freeze liquid
Rain water	Solvent containing fluids
Groundwater	Lactic acid, watery
Seawater/river water	Sulphuric acid containing fluids
Mineral water	Hydrochloric acid containing fluids
Chlorine water	Ethyl alcohol
Salt water	Galvanic bath
Brine	
Vegetable oils	
Fruit acids	
Alcohol	

These lists were made to the best of one's knowledge and information's from our material suppliers.

As there is no plastic, which is resistant against all medias and temperatures, mix ratio, surface tension, pressure ratio etc. is also important, in critical applications practical attempts have to be done.

MBS 3000 pressure sensor

Features

Designed for use in demanding industrial environments.

- Enclosure of acid-resistant stainless steel (AISI 316L).
- 4-20 mA output signals.
- CE-marked: EMC-protected in accordance with EU EMC Directive.
- Temperature-compensated and laser-calibrated.
- Typical applications:
 - pumps
 - compressors
 - hydraulics
 - pneumatics
 - water treatment.



Fig. 30 MBS sensor

Dimensions

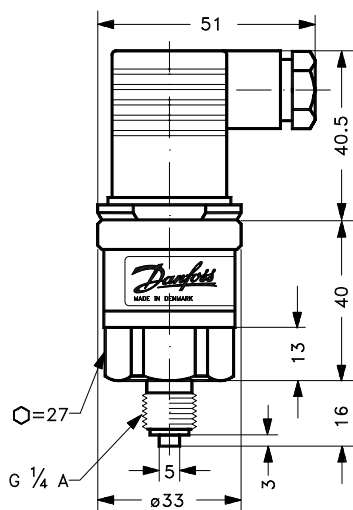
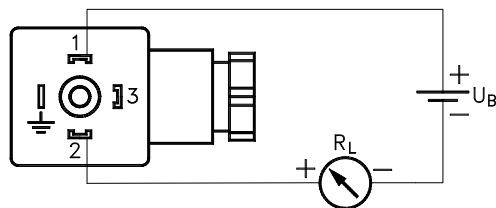


Fig. 31 Dimensional drawing of the MBS sensor

Electrical connection, two-wire, 4-20 mA



- 1 Supply +
- 2 Supply -
- 3 Not used
- ⊕ Connected to transmitter housing

Fig. 32 Rectangular plug EN 175301-803-A

TM05 2187 4511

TM05 2185 4511

TM05 2186 4511

Technical data

Performance

Accuracy (incl. non-linearity, hysteresis and repeatability)	± 0.5 % FS (typ.) ± 1 % FS (max.)
Non-linearity BFSL (conformity)	≤ ± 0.2 % FS
Hysteresis and repeatability	≤ ± 0.1 % FS
Thermal zero point shift	≤ ± 0.1 % FS/10K (typ.) ≤ ± 0.2 % FS/10K (max.)
Thermal sensitivity (span) shift	≤ ± 0.1 % FS/10K (typ.) ≤ ± 0.2 % FS/10K (max.)
Response time	< 4 ms
Max. operating pressure	See ordering table
Burst pressure	See ordering table

Electrical specifications

Rated output signal	4 to 20 mA
Supply voltage V_{supply} (polarity-protected)	9 → 32 V d.c.
Supply voltage dependency	≤ ± 0.05 % FS/10 V
Current limitation	28 mA (typ.)
Max. load $[R_L]$	$R_L \leq \frac{V_{\text{supply}} - 9 \text{ V}}{0.02 \text{ A}} [\Omega]$

Environmental conditions

Operating temperature range			-40 → +85 °C	
Compensated temperature range			0 → +80 °C	
Transport temperature range			-50 → +85 °C	
EMC - emission			EN 61000-6-3	
EMC immunity	Electrostatic discharge	Air: 8 kV	EN 61000-6-2	
		Contact: 4 kV		
		RF field		10 V/m, 26 MHz - 1 GHz
		RF conducted		3 Vms, 150 kHz - 30 MHz
		Transient burst 4 kV		(CM), clamp
		Transient surge 1 kV		(CM, DM) at Rg = 42 Ω
Insulation resistance			> 100 MΩ at 100 V	
Mains frequency			500 V, 50 Hz SEN 361503	
Vibration stability	Sinusoidal	20 g, 25 Hz - 2 kHz	IEC 60068-2-6	
	Random	7.5 grms, 5 Hz - 1 kHz	IEC 60068-2-64	
Shock resistance	Shock	500 g / 1 ms	IEC 60068-2-27	
	Free fall		IEC 60068-2-32	
Enclosure			IP65 - IEC 60529	

Mechanical characteristics

Pressure connection	G 1/4 A, ISO 228/1
Electrical connections	Rectangular EN 175301-803-A plug
Wetted parts, material	EN10088-1; 1.4404 (AISI 316 L)
Housing material	EN10088-1; 1.4404 (AISI 316 L)
Weight	0.2 kg

Analog level sensor, MPS Siemens

The hydrostatic pressure sensor is for measuring the liquid level in wells, tanks, channels and dams.



Fig. 33 Siemens level sensor MPS

On one side of the sensor, the diaphragm is exposed to the hydrostatic pressure which is proportional to the submersion depth. This pressure is compared with atmospheric pressure.

Pressure compensation is carried out using the vent pipe in the connection cable.

The hydrostatic pressure of the liquid column acts on the sensor diaphragm, and transmits the pressure to the piezo-resistive bridge in the sensor.

The output of the hydrostatic pressure sensor is 4 to 20 mA.

Application

The hydrostatic pressure sensor can be used in the following application:

- Water abstraction
- Water treatment
- Water distribution
- Wastewater treatment
- Irrigation
- Mining
- Oil and gas industries.

Installation

Where sensor cables have to be extended, the cable of the hydrostatic pressure sensor can be connected in the supplied junction box. The junction box has to be installed near the measuring point.

Keep the venting pipe free in order for the hydrostatic pressure sensor to work properly.

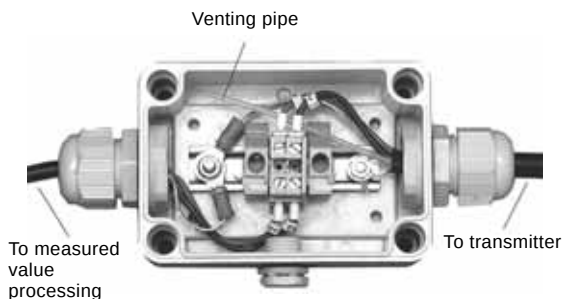
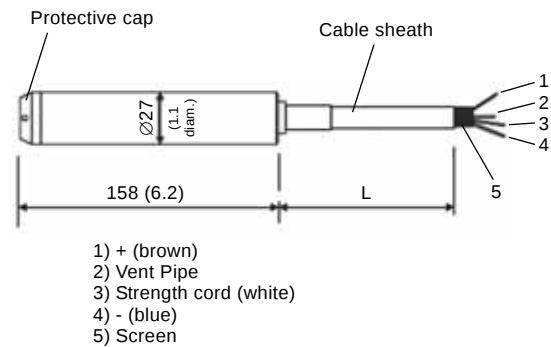


Fig. 34 Junction box for MPS sensor

Dimension



Cable sheath 8.3 (0.33) diam. (black or blue, PE/HFFR).
Flexible cable with 0.5 mm² (0.00078 inch²) cross-section.
Vent pipe 1 (0.04) diam. (inner diameter).
Protective cap with 4 x 3 diam. (4 x 0.12 diam.)
holes (black, PA).

Fig. 35 Hydrostatic pressure sensor, dimensions in mm (inch)

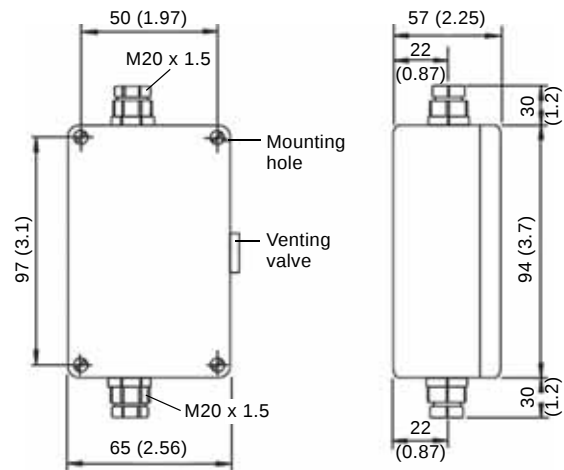


Fig. 36 Junction box, dimension in mm (inch)

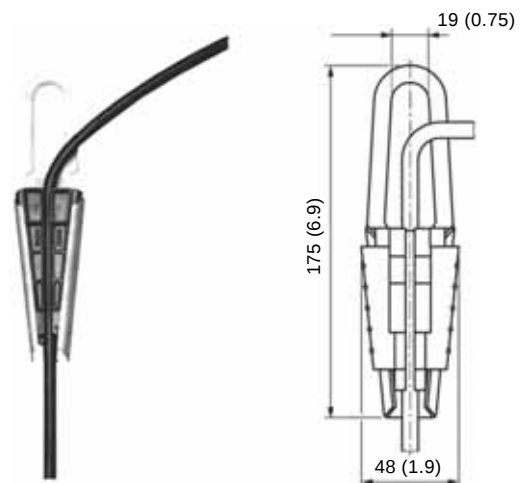


Fig. 37 Cable hanger, dimension in mm (inch)

Ultrasonic level sensor, LU probe Siemens

SITRANS Probe LU is a 2-wire loop-powered ultrasonic transmitter for level, volume, and flow monitoring of liquids in storage vessels and simple process vessels, as well as in open channels.

The transducer is available as ETFE (ethylene-tetrafluoroethylene) or PVDF (polyvinylidene fluoride) to suit the chemical conditions of your application. For applications with varying material and process temperatures, the Probe LU incorporates an internal temperature sensor to compensate for temperature changes.

SITRANS Probe LU uses field-proven Sonic Intelligence[®] signal processing.



TM05 2174 4511

Fig. 38 Siemens LU probe

Applications

Level, volume or flow

SITRANS Probe LU is designed to measure levels of liquids in a variety of applications:

- Storage type vessels
- Simple process vessels with some surface agitation
- Liquids
- Slurries
- Open channels.

Volume

By using the volume parameters (P050 to P055) you can obtain the measurement as volume instead of level.

Programming

SITRANS Probe LU carries out its level measurement function according to the set of built-in parameters. Parameter changes can be made via the hand programmer, via a PC using SIMATIC PDM, or via a HART Handheld Communicator.

Performance

Reference operating conditions according to IEC 60770-1

- Ambient temperature +15 to +25 °C
- Humidity 45 to 75 % relative humidity
- Ambient pressure 860 to 1060 mbar

Measurement accuracy (measured in accordance with IEC 60770-1)

- Non-linearity (accuracy) greater of 6 mm (0.24") or 0.15 % of span (including hysteresis and non-repeatability)
- Non-repeatability 3 mm (0.19") [included in non-linearity specification]
- Deadband (resolution) 3 mm (0.19") [included in non-linearity specification]
- Hysteresis error 0 mm

Analog output accuracy (measured in accordance with IEC 60770-1)

- Non-linearity (accuracy) 0.125 % of span (including hysteresis and repeatability)
- Non-repeatability 0.025 % of span (included in non-linearity specification)
- Deadband (resolution) 0.0375 % of span [included in non-linearity specification]
- Hysteresis error 0 %

Frequency 54 KHz

Measurement range

6 m (20 ft) model: 0.25 m to 6 m (10" to 20 ft) liquid.
12 m (40 ft) model: 0.25 m to 12 m (10" to 40 ft) liquid.

Note: Siemens Milltronics makes every attempt to ensure the accuracy of these specifications but reserves the right to change them at any time.

Nominal 24 V DC at max. 550 Ω.

For other configurations, see the chart Loop Voltage versus Loop Resistance.

1. Reference conditions.
2. Reference point for measurement is the transducer face.

Interface

- HART standard, integral to analog output
- configuration Siemens SIMATIC PDM (PC), or HART handheld communicator, or Siemens Milltronics infrared hand programmer
- analog output 4-20 mA $\pm$ 0.02 mA accuracy
- display (local) multisegment alphanumeric liquid crystal with Bar graph (representing level)

Flowmeters, MAGflow Siemens

SITRANS F M, electromagnetic flowmeter

The range of SITRANS F M electromagnetic flowmeters will help you to do an easier job managing flow, whether it is installation, managing operations or verifying continuous accuracy.

The range consists of two sensor tubes, type MAG 3100 or MAG 5100, and an MAG 5000 transmitter unit.

The sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

The sensor is built-up of a stainless steel pipe, two coils, electrodes, an isolating liner, housing and connecting flanges.

The transmitter unit comes in two versions, one as a remote installed transmitter and one as a compact installed transmitter. The transmitter consists of a number of function blocks which convert the sensor voltage into flow readings.

MAG 5000

The transmitter is specially designed to offer high performance, easy operation and reduced maintenance.



TM05 2175 4511

Fig. 39 MAG 5000 transmitter

Data

Enclosure	IP67
Max measuring error	0.50 % of rate
Display	3-line alpha numeric LCD with backlight
Input and output	1 analogue current output – 0-20 mA – 4-20 mA 1 pulse/freq output 1 relay output
Power supply	11-30 V DC or 11-24 V AC 115-230 V AC +10 % -15 %, 50-60 Hz
Power consumption	12 V DC: 11 W, $I_N = 920$ mA, $I_{ST} = 4$ A (250 ms) 24 V AC: 9 W, $I_N = 380$ mA, $I_{ST} = 8$ A (30 ms) 230 V AC: 9 VA
Approvals	FM/CSA (Class 1, Div 2)
Language	GB, D, F, E, I, S, DK, FIN, RU, P, PL

MAG 3100

This sensor tube is a fully welded construction which provides a ruggedness that suits the toughest environments.

This sensor allows special cleaning pigs to pass through.



TM05 2176 4511

Fig. 40 MAG 3100 sensor tube

Data

Size DN	DN 50-300
Process temperature	0 to 70 [°C]
Ambient temperature	-40 to 100 [°C] ¹⁾ -20 to 50 [°C] ²⁾
Pressure rating max.	DN 50, 40 bar DN 65 - DN 150, 16 bar ³⁾ DN 200 - DN 300, 10 bar ³⁾
Liner material	Neoprene
Electrode material	AISI 316 Ti (1.4571)
Measuring pipe	AISI 304 (1.4301)
Flange	Carbon steel ⁴⁾
Housing material	Carbon steel ⁴⁾
Approvals	FM/CSA (Class 1, Div 2)

1) Remote transmitter.

2) Compact transmitter.

3) EN 1092-1.

4) Corrosion-resistant two component coating (150 µm).

MAG 5100

A sensor tube for all water applications; with its coned design, increased low-flow accuracy is achieved making it especially useful for leak detection.

The MAG 5000 transmitter and MAG 5100 sensor is the perfect match for a cost-effective solution.



TM05 2177 4511

Fig. 41 MAG 5100 sensor tube

Data

Size DN	DN 50-300
Process temperature	10 to 70 [°C]
Ambient temperature	-40 to 70 [°C] ¹⁾ -20 to 50 [°C] ²⁾
Pressure rating max.	DN 50 - DN 150, 16 bar ³⁾ DN 200 - DN 300, 10 bar ³⁾
Liner material	EPDM
Electrode material	Hastelloy
Measuring pipe	AISI 304 (1.4301)
Flange	Carbon steel ⁴⁾
Housing material	Carbon steel ⁴⁾
Approvals	WRAS NSF61 DVGW Belgaqua ACS FM/CSA (Class 1, Div 2)

¹⁾ Remote transmitter.

²⁾ Compact transmitter.

³⁾ EN 1092-1.

⁴⁾ Corrosion-resistant two component epoxy coating (150 µm).

Selection guide

Sensors and transmitters can meet any need in just about any industry.

The overview makes it easy to select the right flowmeter solution for your application.

		MAG5000 + MAG3100	MAG5000 + MAG5100
Water and wastewater	Abstraction		•
	Water treatment		•
	Distribution		•
	Revenue/billing		•
	Wastewater treatment	•	
	Re-use/filtration		•
	Irrigation		•
Chemical industry	Basic chemicals	•	
	Fibres and foils	•	
	Speciality chemicals	•	
	Fine chemicals	•	
	Bio-chemicals	•	
Food, beverage and pharmaceutical	Food		•
	Dairy		•
	Soft drink		
	Beverages	•	
	Pharmaceutical	•	
Mining, cement, pulp and paper	Mining	•	
	Cement	•	
	Pulp and paper	•	
Power and utilities	District cooling and chillers	•	
Oil and gas	Upstream	•	
	Midstream	•	
	Downstream	•	

The table below shows the relationship between flow velocity [m/s], flow quantity [m³/h] and sensor dimension DN.

Normally the sensor is selected so that the flow velocity lies within the measuring range 1-5 [m/s].

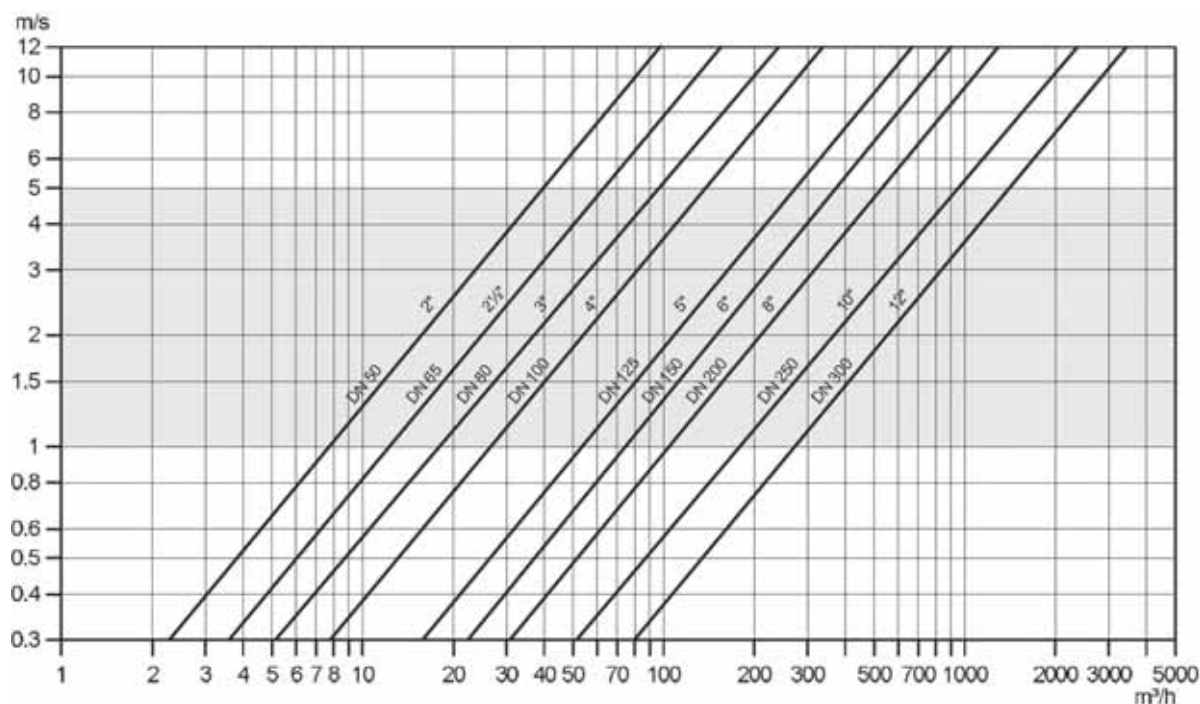


Fig. 46 Selection guide for MAG flowmeters

TM05 2182 4511

How to order MAG flowmeters

Note: To order a complete flowmeter, order a sensor tube plus a control unit.



Fig. 47 MAG flowmeters without transmitter

TM05 2183 4511 - TM05 2184 4511

7. Product numbers

Dedicated Controls panels

Table for 1 pump

Product number	Type	Pumps	Min. [A]	Max. [A]	Start type	Voltage [V]
98297457	Control DC	1x	1	1.6	DOL	1 x 230
98297458	Control DC	1x	1.6	2.5	DOL	1 x 230
98297459	Control DC	1x	2.5	4	DOL	1 x 230
98297460	Control DC	1x	4	6.3	DOL	1 x 230
98297461	Control DC	1x	6	10	DOL	1 x 230
97900378	Control DC	1x	1	1.6	DOL	3 x 400
97900379	Control DC	1x	1.6	2.5	DOL	3 x 400
97900380	Control DC	1x	2.5	4	DOL	3 x 400
97900391	Control DC	1x	4	6.3	DOL	3 x 400
97900392	Control DC	1x	6	10	DOL	3 x 400
97900393	Control DC	1x	4	12	SST	3 x 400
97900394	Control DC	1x	0	13	ESS	3 x 400
97900395	Control DC	1x	9	14	SD	3 x 400
97900396	Control DC	1x	0	16	ESS	3 x 400
97900397	Control DC	1x	13	18	SD	3 x 400
97900398	Control DC	1x	12	22	SST	3 x 400
97900399	Control DC	1x	17	23	SD	3 x 400
98297467	Control DC	1x	20	25	SD	3 x 400
97900400	Control DC	1x	0	24	ESS	3 x 400
97900401	Control DC	1x	0	32	ESS	3 x 400
97900402	Control DC	1x	24	32	SD	3 x 400
97900403	Control DC	1x	22	32	SST	3 x 400
97900404	Control DC	1x	0	37.5	ESS	3 x 400
97900405	Control DC	1x	28	41	SD	3 x 400
97900406	Control DC	1x	0	44	ESS	3 x 400
97900407	Control DC	1x	32	44	SST	3 x 400
97900408	Control DC	1x	40	55	SD	3 x 400
97900409	Control DC	1x	0	61	ESS	3 x 400
97900410	Control DC	1x	52	68	SD	3 x 400
97900411	Control DC	1x	44	72	SST	3 x 400
97900412	Control DC	1x	0	73	ESS	3 x 400
97900413	Control DC	1x	72	85	SST	3 x 400
97900414	Control DC	1x	64	86	SD	3 x 400
97900415	Control DC	1x	0	90	ESS	3 x 400
97900416	Control DC	1x	20	100	SST	3 x 400
97900417	Control DC	1x	0	106	ESS	3 x 400
97900418	Control DC	1x	83	112	SD	3 x 400
97900419	Control DC	1x	27	133	SST	3 x 400
97900420	Control DC	1x	108	137	SD	3 x 400
97900421	Control DC	1x	0	147	ESS	3 x 400

Start type:

DOL: Direct-on-line

SD: Star/delta

SST: Softstarter

ESS: Frequency converter

Table for 2 pumps

Product number	Type	Pumps	Min. [A]	Max. [A]	Start type	Voltage [V]
98297462	Control DC	2x	1	1.6	DOL	1 x 230
98297463	Control DC	2x	1.6	2.5	DOL	1 x 230
98297464	Control DC	2x	2.5	4	DOL	1 x 230
98297465	Control DC	2x	4	6.3	DOL	1 x 230
98297466	Control DC	2x	6	10	DOL	1 x 230
97900422	Control DC	2x	1	1.6	DOL	3 x 400
97900423	Control DC	2x	1.6	2.5	DOL	3 x 400
97900424	Control DC	2x	2.5	4	DOL	3 x 400
97900425	Control DC	2x	4	6.3	DOL	3 x 400
97900426	Control DC	2x	6	10	DOL	3 x 400
97900427	Control DC	2x	4	12	SST	3 x 400
97900428	Control DC	2x	0	13	ESS	3 x 400
97900429	Control DC	2x	9	14	SD	3 x 400
97900430	Control DC	2x	0	16	ESS	3 x 400
97900431	Control DC	2x	13	18	SD	3 x 400
97900432	Control DC	2x	12	22	SST	3 x 400
97900433	Control DC	2x	17	23	SD	3 x 400
98297468	Control DC	2x	20	25	SD	3 x 400
97900434	Control DC	2x	0	24	ESS	3 x 400
97900435	Control DC	2x	0	32	ESS	3 x 400
97900436	Control DC	2x	24	32	SD	3 x 400
97900437	Control DC	2x	22	32	SST	3 x 400
97900438	Control DC	2x	0	37.5	ESS	3 x 400
97900439	Control DC	2x	28	41	SD	3 x 400
97900440	Control DC	2x	0	44	ESS	3 x 400
97900441	Control DC	2x	32	44	SST	3 x 400
97900442	Control DC	2x	40	55	SD	3 x 400
97900443	Control DC	2x	0	61	ESS	3 x 400
97900444	Control DC	2x	52	68	SD	3 x 400
97900445	Control DC	2x	44	72	SST	3 x 400
97900446	Control DC	2x	0	73	ESS	3 x 400
97900447	Control DC	2x	72	85	SST	3 x 400
97900448	Control DC	2x	64	86	SD	3 x 400
97900449	Control DC	2x	0	90	ESS	3 x 400
97900450	Control DC	2x	20	100	SST	3 x 400
97900451	Control DC	2x	0	106	ESS	3 x 400
97900452	Control DC	2x	83	112	SD	3 x 400
97900453	Control DC	2x	27	133	SST	3 x 400
97900454	Control DC	2x	108	137	SD	3 x 400
97900455	Control DC	2x	0	147	ESS	3 x 400

Start type:

DOL: Direct-on-line

SD: Star/delta

SST: Softstarter

ESS: Frequency converter

Table for 3 pumps

Product number	Type	Pumps	Min. [A]	Max. [A]	Start type	Voltage [V]
97900456	Control DC	3x	1	1.6	DOL	3 x 400
97900457	Control DC	3x	1.6	2.5	DOL	3 x 400
97900458	Control DC	3x	2.5	4	DOL	3 x 400
97900459	Control DC	3x	4	6.3	DOL	3 x 400
97900460	Control DC	3x	6	10	DOL	3 x 400
97900461	Control DC	3x	4	12	SST	3 x 400
97900462	Control DC	3x	0	13	ESS	3 x 400
97900463	Control DC	3x	9	14	SD	3 x 400
97900464	Control DC	3x	0	16	ESS	3 x 400
97900465	Control DC	3x	13	18	SD	3 x 400
97900466	Control DC	3x	12	22	SST	3 x 400
97900467	Control DC	3x	17	23	SD	3 x 400
98297469	Control DC	3x	20	25	SD	3 x 400
97900468	Control DC	3x	0	24	ESS	3 x 400
97900469	Control DC	3x	0	32	ESS	3 x 400
97900470	Control DC	3x	24	32	SD	3 x 400
97900471	Control DC	3x	22	32	SST	3 x 400
97900472	Control DC	3x	0	37.5	ESS	3 x 400
97900473	Control DC	3x	28	41	SD	3 x 400
97900474	Control DC	3x	0	44	ESS	3 x 400
97900475	Control DC	3x	32	44	SST	3 x 400
97900476	Control DC	3x	40	55	SD	3 x 400
97900477	Control DC	3x	0	61	ESS	3 x 400
97900478	Control DC	3x	52	68	SD	3 x 400
97900479	Control DC	3x	44	72	SST	3 x 400
97900480	Control DC	3x	0	73	ESS	3 x 400
97900481	Control DC	3x	72	85	SST	3 x 400
97900482	Control DC	3x	64	86	SD	3 x 400
97900483	Control DC	3x	0	90	ESS	3 x 400
97900484	Control DC	3x	20	100	SST	3 x 400
97900485	Control DC	3x	0	106	ESS	3 x 400
97900486	Control DC	3x	83	112	SD	3 x 400
97900487	Control DC	3x	27	133	SST	3 x 400
97900488	Control DC	3x	108	137	SD	3 x 400
97900489	Control DC	3x	0	147	ESS	3 x 400

Start type:

DOL: Direct-on-line

SD: Star/delta

SST: Softstarter

ESS: Frequency converter

Table for 4 pumps

Product number	Type	Pumps	Min. [A]	Max. [A]	Start type	Voltage [V]
97900490	Control DC	4x	1	1.6	DOL	3 x 400
97900491	Control DC	4x	1.6	2.5	DOL	3 x 400
97900492	Control DC	4x	2.5	4	DOL	3 x 400
97900493	Control DC	4x	4	6.3	DOL	3 x 400
97900494	Control DC	4x	6	10	DOL	3 x 400
97900495	Control DC	4x	4	12	SST	3 x 400
97900496	Control DC	4x	0	13	ESS	3 x 400
97900497	Control DC	4x	9	14	SD	3 x 400
97900498	Control DC	4x	0	16	ESS	3 x 400
97900499	Control DC	4x	13	18	SD	3 x 400
97900500	Control DC	4x	12	22	SST	3 x 400
97900501	Control DC	4x	17	23	SD	3 x 400
98297470	Control DC	4x	20	25	SD	3 x 400
97900502	Control DC	4x	0	24	ESS	3 x 400
97900503	Control DC	4x	0	32	ESS	3 x 400
97900504	Control DC	4x	24	32	SD	3 x 400
97900505	Control DC	4x	22	32	SST	3 x 400
97900506	Control DC	4x	0	37.5	ESS	3 x 400
97900507	Control DC	4x	28	41	SD	3 x 400
97900508	Control DC	4x	0	44	ESS	3 x 400
97900509	Control DC	4x	32	44	SST	3 x 400
97900510	Control DC	4x	40	55	SD	3 x 400
97900511	Control DC	4x	0	61	ESS	3 x 400
97900512	Control DC	4x	52	68	SD	3 x 400
97900513	Control DC	4x	44	72	SST	3 x 400
97900514	Control DC	4x	0	73	ESS	3 x 400
97900515	Control DC	4x	72	85	SST	3 x 400
97900516	Control DC	4x	64	86	SD	3 x 400
97900517	Control DC	4x	0	90	ESS	3 x 400
97900518	Control DC	4x	20	100	SST	3 x 400
97900519	Control DC	4x	0	106	ESS	3 x 400
97900520	Control DC	4x	83	112	SD	3 x 400
97900521	Control DC	4x	27	133	SST	3 x 400
97900522	Control DC	4x	108	137	SD	3 x 400
97900523	Control DC	4x	0	147	ESS	3 x 400

Start type:

DOL: Direct-on-line

SD: Star/delta

SST: Softstarter

ESS: Frequency converter

Table for 5 pumps

Product number	Type	Pumps	Min. [A]	Max. [A]	Start type	Voltage [V]
97900524	Control DC	5x	1	1.6	DOL	3 x 400
97900525	Control DC	5x	1.6	2.5	DOL	3 x 400
97900526	Control DC	5x	2.5	4	DOL	3 x 400
97900527	Control DC	5x	4	6.3	DOL	3 x 400
97900528	Control DC	5x	6	10	DOL	3 x 400
97900529	Control DC	5x	4	12	SST	3 x 400
97900530	Control DC	5x	0	13	ESS	3 x 400
97900531	Control DC	5x	9	14	SD	3 x 400
97900532	Control DC	5x	0	16	ESS	3 x 400
97900533	Control DC	5x	13	18	SD	3 x 400
97900534	Control DC	5x	12	22	SST	3 x 400
97900535	Control DC	5x	17	23	SD	3 x 400
98297471	Control DC	5x	20	25	SD	3 x 400
97900536	Control DC	5x	0	24	ESS	3 x 400
97900537	Control DC	5x	0	32	ESS	3 x 400
97900538	Control DC	5x	24	32	SD	3 x 400
97900539	Control DC	5x	22	32	SST	3 x 400
97900540	Control DC	5x	0	37.5	ESS	3 x 400
97900541	Control DC	5x	28	41	SD	3 x 400
97900542	Control DC	5x	0	44	ESS	3 x 400
97900543	Control DC	5x	32	44	SST	3 x 400
97900544	Control DC	5x	40	55	SD	3 x 400
97900545	Control DC	5x	0	61	ESS	3 x 400
97900546	Control DC	5x	52	68	SD	3 x 400
97900547	Control DC	5x	44	72	SST	3 x 400
97900548	Control DC	5x	0	73	ESS	3 x 400
97900549	Control DC	5x	72	85	SST	3 x 400
97900550	Control DC	5x	64	86	SD	3 x 400
97900551	Control DC	5x	0	90	ESS	3 x 400
97900552	Control DC	5x	20	100	SST	3 x 400
97900553	Control DC	5x	0	106	ESS	3 x 400
97900554	Control DC	5x	83	112	SD	3 x 400
97900555	Control DC	5x	27	133	SST	3 x 400
97900556	Control DC	5x	108	137	SD	3 x 400
97900557	Control DC	5x	0	147	ESS	3 x 400

Start type:

DOL: Direct-on-line

SD: Star/delta

SST: Softstarter

ESS: Frequency converter

Table for 6 pumps

Product number	Type	Pumps	Min. [A]	Max. [A]	Start type	Voltage [V]
97900558	Control DC	6x	1	1.6	DOL	3 x 400
97900559	Control DC	6x	1.6	2.5	DOL	3 x 400
97900560	Control DC	6x	2.5	4	DOL	3 x 400
97900561	Control DC	6x	4	6.3	DOL	3 x 400
97900562	Control DC	6x	6	10	DOL	3 x 400
97900563	Control DC	6x	4	12	SST	3 x 400
97900564	Control DC	6x	0	13	ESS	3 x 400
97900565	Control DC	6x	9	14	SD	3 x 400
97900566	Control DC	6x	0	16	ESS	3 x 400
97900567	Control DC	6x	13	18	SD	3 x 400
97900568	Control DC	6x	12	22	SST	3 x 400
97900569	Control DC	6x	17	23	SD	3 x 400
98297472	Control DC	6x	20	25	SD	3 x 400
97900570	Control DC	6x	0	24	ESS	3 x 400
97900571	Control DC	6x	0	32	ESS	3 x 400
97900572	Control DC	6x	24	32	SD	3 x 400
97900573	Control DC	6x	22	32	SST	3 x 400
97900574	Control DC	6x	0	37.5	ESS	3 x 400
97900575	Control DC	6x	28	41	SD	3 x 400
97900576	Control DC	6x	0	44	ESS	3 x 400
97900577	Control DC	6x	32	44	SST	3 x 400
97900578	Control DC	6x	40	55	SD	3 x 400
97900579	Control DC	6x	0	61	ESS	3 x 400
97900580	Control DC	6x	52	68	SD	3 x 400
97900581	Control DC	6x	44	72	SST	3 x 400
97900582	Control DC	6x	0	73	ESS	3 x 400
97900583	Control DC	6x	72	85	SST	3 x 400
97900584	Control DC	6x	64	86	SD	3 x 400
97900585	Control DC	6x	0	90	ESS	3 x 400
97900586	Control DC	6x	20	100	SST	3 x 400
97900587	Control DC	6x	0	106	ESS	3 x 400
97900588	Control DC	6x	83	112	SD	3 x 400
97900589	Control DC	6x	27	133	SST	3 x 400
97900590	Control DC	6x	108	137	SD	3 x 400
97900591	Control DC	6x	0	147	ESS	3 x 400

Start type:

DOL: Direct-on-line

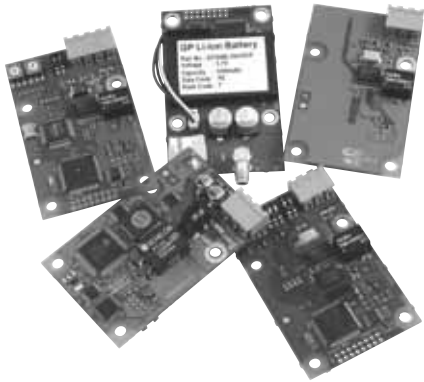
SD: Star/delta

SST: Softstarter

ESS: Frequency converter

Accessories and options

Communication

Component	Description	Product number
	CIM 200 Modbus	91047457
	CIM 250 GSM/GPRS	91047458
	CIM 271 GRM	91047459
	Antenna for CIM 250/271 Antenna for use on top of metal cabinets, vandal-proof, 2 meter cable, QUAD Band (global use).	97631956

IP protection

Description	Remark
Cabinet IP Class (according to DIN EN 60529) IP54	Our standard, with full protection against contact, protection against interior injurious dust deposits and protection against splashed water from all directions.
Cabinet IP Class (according to DIN EN 60529) IP65	Total protection against contact, protection against penetration of dust and protection against water (out of a nozzle) from all directions.

Indication

Component	Description	Product number
	System fault light A red light in the panel that indicates a general alarm.	91047460
	Pump fault light A red light in the panel for each pump that indicates an alarm.	91047461
	Audible alarm 100 dB Audible alarm and silence button in the panel that indicates a general alarm.	91047462
	Ammeter 6 A per pump	91047463
	Ammeter 16 A per pump	91047464
	Ammeter 25 A per pump	91047465
	Ammeter 40 A per pump	91047466
	Ammeter 80 A per pump	91047467
	Ammeter 100 A per pump	91047468
	Ammeter 150 A per pump	91047469
	Ammeter 200 A per pump	91047470
	Ammeter 250 A per pump	91047471
	Ammeter 400 A per pump	91047472
	Voltmeter (with phase switch) Displaying the voltage between phases and neutral.	91047473
	Hour counter in cabinet door Hour counter for each pump in cabinet door.	91047474
	Beacon internal Internal: A flashing light at the top of the panel to indicate a general alarm. External: Terminals for connecting an external flashing light.	91047475

Communication

Component	Description	Product number
	MP 204 per pump This option adds a MP 204 motor protection unit for each pump in your cabinet. Remark: Not possible in combination with frequency converters.	91047476
	Sensor module IO 113 IO 113 can do the following as standard: • Protect the pump against overheating. • Monitor the status of these items: – motor winding temperature – leakage (WIO/WIA)* – moisture in pump or mixer. • Measure the stator insulation resistance. • Stop the pump or mixer in case of alarm. • Remotely monitor the pump via RS-485 communication (Modbus or GENIbus). IO 113 is available in two variants: • without communication module (standard variant) • with communication module. The product number (pos. 2 on the nameplate) shows the variant. Note: These options are only available with Control DC panel range.	98097391 (standard variant) 98097390 (variant with communication module)
	Sensor module IO 113 + SM 113 When IO 113 is combined with an SM 113, it is possible to monitor the following: • Current sensors, 4-20 mA* • Pt100**/Pt1000*** thermal sensors • Speed sensor • Bearing temperature • Vibration in pump or mixer • Rotor speed when the motor is powered off. * Water-in-oil (WIO) / water-in-air (WIA) sensor. ** Maximum 3 Pt100 sensors. *** Maximum 4 Pt1000 sensors. Note: These options are only available with Control DC panel range.	98149751

System protection

Component	Description	Product number
	Phase failure relay/monitoring Supervises the power supply and goes into the general alarm if there is a problem.	91047479
	Main switch with neutral The neutral will be broken by the main switch.	91047480
	Transient voltage protection Surge protective device Class II rel. IEC 61643-1.	91047481
	Lightning protection Surge protective device Class I rel. IEC 61643-1.	91047482
	RCD per pump up to 63 A	91047483

Component	Description	Product number
	Ex-barrier analog sensor 0/4-20mA	91047484
	Ex-Barrier float switch 2 inputs	91047485
	Ex-Barrier float switch 4 inputs	91047486
	Ex-Barrier float switch 6 inputs	91047487
	Auto switch power supply - 45 kW Automatically switch-over to a second power supply if the main supply fails. Phase-failure relay included.	91047488

Others

Component	Description	Product number
	Output for mixer or flush valve Switching contact to connect a mixer or flush valve.	91047489
	Cabinet heater 30 W To avoid condensation insight the panels. As standard including thermostatical control. Also available with hygrostat.	91047490
	Float switch, dry-running/high level	91047491
	Float switch, start/stop pump	91047492
	Analog level sensor with 10 m cable	91047493
	Analog level sensor with 25 m cable	91047494
	Analog level sensor with 50 m cable	91047495
	Junction box for sensor cable	91047496

Component	Description	Product number
	Ultrasonic level sensor	91047497
	Handheld programmable ultrasonic	91047498
	Panel light 230 V with socket	91047499
	Manual reset switch on cabinet door Push button in the cabinet door for manual resetting of alarms.	91047500
	External service plug 3 x 400 V, 16 A	91047501
	Outdoor cabinet (metal, plastic modules) Cabinet door is equipped with lock. Note: For all panel in outdoor cabinets, please contact Grundfos.	91047502
	Outdoor cabinet (metal, double door)* Cabinet door is equipped with lock. * FPV variants available in stainless steel Note: For all panel in outdoor cabinets, please contact Grundfos.	91047503

MPC**Control MPC-E**

Type	Pumps		kW	Product number
Control MPC-E 2x0.37 E, 3x380-415/220-240 V, 50-60 Hz	2	MPC-E	0.37	96018256
Control MPC-E 3x0.37 E, 3x380-415/220-240 V, 50-60 Hz	3	MPC-E	0.37	96018257
Control MPC-E 4x0.37 E, 3x380-415/220-240 V, 50-60 Hz	4	MPC-E	0.37	96018258
Control MPC-E 5x0.37 E, 3x380-415/220-240 V, 50-60 Hz	5	MPC-E	0.37	96018261
Control MPC-E 6x0.37 E, 3x380-415/220-240 V, 50-60 Hz	6	MPC-E	0.37	96018262
Control MPC-E 2x0.55 E, 3x380-415/220-240 V, 50-60 Hz	2	MPC-E	0.55	96014501
Control MPC-E 3x0.55 E, 3x380-415/220-240 V, 50-60 Hz	3	MPC-E	0.55	96014502
Control MPC-E 4x0.55 E, 3x380-415/220-240 V, 50-60 Hz	4	MPC-E	0.55	96014503
Control MPC-E 5x0.55 E, 3x380-415/220-240 V, 50-60 Hz	5	MPC-E	0.55	96014504
Control MPC-E 6x0.55 E, 3x380-415/220-240 V, 50-60 Hz	6	MPC-E	0.55	96014505
Control MPC-E 2x0.75 E, 3x380-415/220-240 V, 50-60 Hz	2	MPC-E	0.75	96014507
Control MPC-E 3x0.75 E, 3x380-415/220-240 V, 50-60 Hz	3	MPC-E	0.75	96014508
Control MPC-E 4x0.75 E, 3x380-415/220-240 V, 50-60 Hz	4	MPC-E	0.75	96014509
Control MPC-E 5x0.75 E, 3x380-415/220-240 V, 50-60 Hz	5	MPC-E	0.75	96014510
Control MPC-E 6x0.75 E, 3x380-415/220-240 V, 50-60 Hz	6	MPC-E	0.75	96014511
Control MPC-E 2x1.1 E, 3x380-415/220-240 V, 50-60 Hz	2	MPC-E	1.1	96014513
Control MPC-E 3x1.1 E, 3x380-415/220-240 V, 50-60 Hz	3	MPC-E	1.1	96014514
Control MPC-E 4x1.1 E, 3x380-415/220-240 V, 50-60 Hz	4	MPC-E	1.1	96014515
Control MPC-E 5x1.1 E, 3x380-415/220-240 V, 50-60 Hz	5	MPC-E	1.1	96014516
Control MPC-E 6x1.1 E, 3x380-415/220-240 V, 50-60 Hz	6	MPC-E	1.1	96014517
Control MPC-E 2x0.55 E, 3x380-415 V, 50-60 Hz	2	MPC-E	0.55	96018264
Control MPC-E 3x0.55 E, 3x380-415 V, 50-60 Hz	3	MPC-E	0.55	96018265
Control MPC-E 4x0.55 E, 3x380-415 V, 50-60 Hz	4	MPC-E	0.55	96018266
Control MPC-E 5x0.55 E, 3x380-415 V, 50-60 Hz	5	MPC-E	0.55	96018267
Control MPC-E 6x0.55 E, 3x380-415 V, 50-60 Hz	6	MPC-E	0.55	96018268
Control MPC-E 2x0.75 E, 3x380-415 V, 50-60 Hz	2	MPC-E	0.75	96014519
Control MPC-E 3x0.75 E, 3x380-415 V, 50-60 Hz	3	MPC-E	0.75	96014520
Control MPC-E 4x0.75 E, 3x380-415 V, 50-60 Hz	4	MPC-E	0.75	96014521
Control MPC-E 5x0.75 E, 3x380-415 V, 50-60 Hz	5	MPC-E	0.75	96014522
Control MPC-E 6x0.75 E, 3x380-415 V, 50-60 Hz	6	MPC-E	0.75	96014523
Control MPC-E 2x1.1 E, 3x380-415 V, 50-60 Hz	2	MPC-E	1.1	96014525
Control MPC-E 3x1.1 E, 3x380-415 V, 50-60 Hz	3	MPC-E	1.1	96014526
Control MPC-E 4x1.1 E, 3x380-415 V, 50-60 Hz	4	MPC-E	1.1	96014527
Control MPC-E 5x1.1 E, 3x380-415 V, 50-60 Hz	5	MPC-E	1.1	96014528
Control MPC-E 6x1.1 E, 3x380-415 V, 50-60 Hz	6	MPC-E	1.1	96014529
Control MPC-E 2x1.5 E, 3x380-415 V, 50-60 Hz	2	MPC-E	1.5	96014531
Control MPC-E 3x1.5 E, 3x380-415 V, 50-60 Hz	3	MPC-E	1.5	96014532
Control MPC-E 4x1.5 E, 3x380-415 V, 50-60 Hz	4	MPC-E	1.5	96014533
Control MPC-E 5x1.5 E, 3x380-415 V, 50-60 Hz	5	MPC-E	1.5	96014534
Control MPC-E 6x1.5 E, 3x380-415 V, 50-60 Hz	6	MPC-E	1.5	96014535
Control MPC-E 2x2.2 E, 3x380-415 V, 50-60 Hz	2	MPC-E	2.2	96014537
Control MPC-E 3x2.2 E, 3x380-415 V, 50-60 Hz	3	MPC-E	2.2	96014538
Control MPC-E 4x2.2 E, 3x380-415 V, 50-60 Hz	4	MPC-E	2.2	96014539
Control MPC-E 5x2.2 E, 3x380-415 V, 50-60 Hz	5	MPC-E	2.2	96014540
Control MPC-E 6x2.2 E, 3x380-415 V, 50-60 Hz	6	MPC-E	2.2	96014541
Control MPC-E 2x3 E, 3x380-415 V, 50-60 Hz	2	MPC-E	3	96014543
Control MPC-E 3x3 E, 3x380-415 V, 50-60 Hz	3	MPC-E	3	96014544
Control MPC-E 4x3 E, 3x380-415 V, 50-60 Hz	4	MPC-E	3	96014545
Control MPC-E 5x3 E, 3x380-415 V, 50-60 Hz	5	MPC-E	3	96014546
Control MPC-E 6x3 E, 3x380-415 V, 50-60 Hz	6	MPC-E	3	96014547
Control MPC-E 2x4 E, 3x380-415 V, 50-60 Hz	2	MPC-E	4	96014549
Control MPC-E 3x4 E, 3x380-415 V, 50-60 Hz	3	MPC-E	4	96014550
Control MPC-E 4x4 E, 3x380-415 V, 50-60 Hz	4	MPC-E	4	96014551
Control MPC-E 5x4 E, 3x380-415 V, 50-60 Hz	5	MPC-E	4	96014552
Control MPC-E 6x4 E, 3x380-415 V, 50-60 Hz	6	MPC-E	4	96014553
Control MPC-E 2x5.5 E, 3x380-415 V, 50-60 Hz	2	MPC-E	5.5	96014555
Control MPC-E 3x5.5 E, 3x380-415 V, 50-60 Hz	3	MPC-E	5.5	96014556
Control MPC-E 4x5.5 E, 3x380-415 V, 50-60 Hz	4	MPC-E	5.5	96014557
Control MPC-E 5x5.5 E, 3x380-415 V, 50-60 Hz	5	MPC-E	5.5	96014558
Control MPC-E 6x5.5 E, 3x380-415 V, 50-60 Hz	6	MPC-E	5.5	96014559
Control MPC-E 2x7.5 E, 3x380-415 V, 50-60 Hz	2	MPC-E	7.5	96014561
Control MPC-E 3x7.5 E, 3x380-415 V, 50-60 Hz	3	MPC-E	7.5	96014562
Control MPC-E 4x7.5 E, 3x380-415 V, 50-60 Hz	4	MPC-E	7.5	96014563
Control MPC-E 5x7.5 E, 3x380-415 V, 50-60 Hz	5	MPC-E	7.5	96014564
Control MPC-E 6x7.5 E, 3x380-415 V, 50-60 Hz	6	MPC-E	7.5	96014565
Control MPC-E 2x11 E, 3x380-415 V, 50-60 Hz	2	MPC-E	11	96014567

Type	Pumps		kW	Product number
Control MPC-E 3x11 E, 3x380-415 V, 50-60 Hz	3	MPC-E	11	96014568
Control MPC-E 4x11 E, 3x380-415 V, 50-60 Hz	4	MPC-E	11	96014569
Control MPC-E 5x11 E, 3x380-415 V, 50-60 Hz	5	MPC-E	11	96014570
Control MPC-E 6x11 E, 3x380-415 V, 50-60 Hz	6	MPC-E	11	96014571
Control MPC-E 2x15 E, 3x380-415 V, 50-60 Hz	2	MPC-E	15	96014573
Control MPC-E 3x15 E, 3x380-415 V, 50-60 Hz	3	MPC-E	15	96014574
Control MPC-E 4x15 E, 3x380-415 V, 50-60 Hz	4	MPC-E	15	96014575
Control MPC-E 5x15 E, 3x380-415 V, 50-60 Hz	5	MPC-E	15	96014576
Control MPC-E 6x15 E, 3x380-415 V, 50-60 Hz	6	MPC-E	15	96014577
Control MPC-E 2x18.5 E, 3x380-415 V, 50-60 Hz	2	MPC-E	18.5	96014579
Control MPC-E 3x18.5 E, 3x380-415 V, 50-60 Hz	3	MPC-E	18.5	96014580
Control MPC-E 4x18.5 E, 3x380-415 V, 50-60 Hz	4	MPC-E	18.5	96014581
Control MPC-E 5x18.5 E, 3x380-415 V, 50-60 Hz	5	MPC-E	18.5	96014582
Control MPC-E 6x18.5 E, 3x380-415 V, 50-60 Hz	6	MPC-E	18.5	96014583
Control MPC-E 2x22 E, 3x380-415 V, 50-60 Hz	2	MPC-E	22	96014585
Control MPC-E 3x22 E, 3x380-415 V, 50-60 Hz	3	MPC-E	22	96014586
Control MPC-E 4x22 E, 3x380-415 V, 50-60 Hz	4	MPC-E	22	96014587
Control MPC-E 5x22 E, 3x380-415 V, 50-60 Hz	5	MPC-E	22	96014588
Control MPC-E 6x22 E, 3x380-415 V, 50-60 Hz	6	MPC-E	22	96014589
Control MPC-E 2x30 E, 3x380-415 V, 50-60 Hz	2	MPC-E	30	96018323
Control MPC-E 3x30 E, 3x380-415 V, 50-60 Hz	3	MPC-E	30	96018324
Control MPC-E 4x30 E, 3x380-415 V, 50-60 Hz	4	MPC-E	30	96018325
Control MPC-E 5x30 E, 3x380-415 V, 50-60 Hz	5	MPC-E	30	96018326
Control MPC-E 6x30 E, 3x380-415 V, 50-60 Hz	6	MPC-E	30	96018327
Control MPC-E 2x37 E, 3x380-415 V, 50-60 Hz	2	MPC-E	37	96018329
Control MPC-E 3x37 E, 3x380-415 V, 50-60 Hz	3	MPC-E	37	96018330
Control MPC-E 4x37 E, 3x380-415 V, 50-60 Hz	4	MPC-E	37	96018331
Control MPC-E 5x37 E, 3x380-415 V, 50-60 Hz	5	MPC-E	37	96018332
Control MPC-E 6x37 E, 3x380-415 V, 50-60 Hz	6	MPC-E	37	96018333
Control MPC-E 2x45 E, 3x380-415 V, 50-60 Hz	2	MPC-E	45	96018335
Control MPC-E 3x45 E, 3x380-415 V, 50-60 Hz	3	MPC-E	45	96018336
Control MPC-E 4x45 E, 3x380-415 V, 50-60 Hz	4	MPC-E	45	96018337
Control MPC-E 5x45 E, 3x380-415 V, 50-60 Hz	5	MPC-E	45	96018338
Control MPC-E 6x45 E, 3x380-415 V, 50-60 Hz	6	MPC-E	45	96018339
Control MPC-E 2x55 E, 3x380-415 V, 50-60 Hz	2	MPC-E	55	96018341
Control MPC-E 3x55 E, 3x380-415 V, 50-60 Hz	3	MPC-E	55	96018342
Control MPC-E 4x55 E, 3x380-415 V, 50-60 Hz	4	MPC-E	55	96018343
Control MPC-E 5x55 E, 3x380-415 V, 50-60 Hz	5	MPC-E	55	96018344
Control MPC-E 6x55 E, 3x380-415 V, 50-60 Hz	6	MPC-E	55	96018345
Control MPC-E 2x75 E, 3x380-415 V, 50-60 Hz	2	MPC-E	75	96018347
Control MPC-E 3x75 E, 3x380-415 V, 50-60 Hz	3	MPC-E	75	96018348
Control MPC-E 4x75 E, 3x380-415 V, 50-60 Hz	4	MPC-E	75	96018349
Control MPC-E 5x75 E, 3x380-415 V, 50-60 Hz	5	MPC-E	75	96018350
Control MPC-E 6x75 E, 3x380-415 V, 50-60 Hz	6	MPC-E	75	96018351

Control MPC-F

Type	Pumps		kW	Product number
Control MPC-F 2x0.55 DOL, 3x380-415 V, 50-60 Hz	2	MPC-F	0.55	96018431
Control MPC-F 3x0.55 DOL, 3x380-415 V, 50-60 Hz	3	MPC-F	0.55	96018432
Control MPC-F 4x0.55 DOL, 3x380-415 V, 50-60 Hz	4	MPC-F	0.55	96018433
Control MPC-F 5x0.55 DOL, 3x380-415 V, 50-60 Hz	5	MPC-F	0.55	96018434
Control MPC-F 6x0.55 DOL, 3x380-415 V, 50-60 Hz	6	MPC-F	0.55	96018435
Control MPC-F 2x0.75 DOL, 3x380-415 V, 50-60 Hz	2	MPC-F	0.75	96018437
Control MPC-F 3x0.75 DOL, 3x380-415 V, 50-60 Hz	3	MPC-F	0.75	96018438
Control MPC-F 4x0.75 DOL, 3x380-415 V, 50-60 Hz	4	MPC-F	0.75	96018439
Control MPC-F 5x0.75 DOL, 3x380-415 V, 50-60 Hz	5	MPC-F	0.75	96018440
Control MPC-F 6x0.75 DOL, 3x380-415 V, 50-60 Hz	6	MPC-F	0.75	96018441
Control MPC-F 2x1.1 DOL, 3x380-415 V, 50-60 Hz	2	MPC-F	1.1	96018443
Control MPC-F 3x1.1 DOL, 3x380-415 V, 50-60 Hz	3	MPC-F	1.1	96018444
Control MPC-F 4x1.1 DOL, 3x380-415 V, 50-60 Hz	4	MPC-F	1.1	96018445
Control MPC-F 5x1.1 DOL, 3x380-415 V, 50-60 Hz	5	MPC-F	1.1	96018446
Control MPC-F 6x1.1 DOL, 3x380-415 V, 50-60 Hz	6	MPC-F	1.1	96018447
Control MPC-F 2x1.5 DOL, 3x380-415 V, 50-60 Hz	2	MPC-F	1.5	96018449
Control MPC-F 3x1.5 DOL, 3x380-415 V, 50-60 Hz	3	MPC-F	1.5	96018450
Control MPC-F 4x1.5 DOL, 3x380-415 V, 50-60 Hz	4	MPC-F	1.5	96018451
Control MPC-F 5x1.5 DOL, 3x380-415 V, 50-60 Hz	5	MPC-F	1.5	96018452
Control MPC-F 6x1.5 DOL, 3x380-415 V, 50-60 Hz	6	MPC-F	1.5	96018453
Control MPC-F 2x2.2 DOL, 3x380-415 V, 50-60 Hz	2	MPC-F	2.2	96018455
Control MPC-F 3x2.2 DOL, 3x380-415 V, 50-60 Hz	3	MPC-F	2.2	96018456
Control MPC-F 4x2.2 DOL, 3x380-415 V, 50-60 Hz	4	MPC-F	2.2	96018457
Control MPC-F 5x2.2 DOL, 3x380-415 V, 50-60 Hz	5	MPC-F	2.2	96018458
Control MPC-F 6x2.2 DOL, 3x380-415 V, 50-60 Hz	6	MPC-F	2.2	96018459
Control MPC-F 2x3 DOL, 3x380-415 V, 50-60 Hz	2	MPC-F	3	96018461
Control MPC-F 3x3 DOL, 3x380-415 V, 50-60 Hz	3	MPC-F	3	96018462
Control MPC-F 4x3 DOL, 3x380-415 V, 50-60 Hz	4	MPC-F	3	96018463
Control MPC-F 5x3 DOL, 3x380-415 V, 50-60 Hz	5	MPC-F	3	96018464
Control MPC-F 6x3 DOL, 3x380-415 V, 50-60 Hz	6	MPC-F	3	96018465
Control MPC-F 2x4 DOL, 3x380-415 V, 50-60 Hz	2	MPC-F	4	96018467
Control MPC-F 3x4 DOL, 3x380-415 V, 50-60 Hz	3	MPC-F	4	96018468
Control MPC-F 4x4 DOL, 3x380-415 V, 50-60 Hz	4	MPC-F	4	96018469
Control MPC-F 5x4 DOL, 3x380-415 V, 50-60 Hz	5	MPC-F	4	96018470
Control MPC-F 6x4 DOL, 3x380-415 V, 50-60 Hz	6	MPC-F	4	96018471
Control MPC-F 2x5.5 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	5.5	96018473
Control MPC-F 3x5.5 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	5.5	96018474
Control MPC-F 4x5.5 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	5.5	96018475
Control MPC-F 5x5.5 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	5.5	96018476
Control MPC-F 6x5.5 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	5.5	96018477
Control MPC-F 2x7.5 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	7.5	96018479
Control MPC-F 3x7.5 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	7.5	96018480
Control MPC-F 4x7.5 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	7.5	96018481
Control MPC-F 5x7.5 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	7.5	96018482
Control MPC-F 6x7.5 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	7.5	96018483
Control MPC-F 2x11 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	11	96018485
Control MPC-F 3x11 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	11	96018486
Control MPC-F 4x11 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	11	96018487
Control MPC-F 5x11 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	11	96018488
Control MPC-F 6x11 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	11	96018489
Control MPC-F 2x15 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	15	96018491
Control MPC-F 3x15 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	15	96018492
Control MPC-F 4x15 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	15	96018493
Control MPC-F 5x15 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	15	96018494
Control MPC-F 6x15 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	15	96018495
Control MPC-F 2x18.5 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	18.5	96018497
Control MPC-F 3x18.5 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	18.5	96018498
Control MPC-F 4x18.5 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	18.5	96018499
Control MPC-F 5x18.5 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	18.5	96018500
Control MPC-F 6x18.5 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	18.5	96018501
Control MPC-F 2x22 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	22	96018503
Control MPC-F 3x22 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	22	96018504
Control MPC-F 4x22 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	22	96018505
Control MPC-F 5x22 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	22	96018506
Control MPC-F 6x22 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	22	96018507
Control MPC-F 2x30 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	30	96018509
Control MPC-F 3x30 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	30	96018510
Control MPC-F 4x30 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	30	96018511

Type	Pumps		kW	Product number
Control MPC-F 5x30 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	30	96018512
Control MPC-F 6x30 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	30	96018513
Control MPC-F 2x37 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	37	96018515
Control MPC-F 3x37 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	37	96018516
Control MPC-F 4x37 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	37	96018517
Control MPC-F 5x37 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	37	96018518
Control MPC-F 6x37 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	37	96018519
Control MPC-F 2x45 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	45	96018521
Control MPC-F 3x45 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	45	96018522
Control MPC-F 4x45 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	45	96018523
Control MPC-F 5x45 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	45	96018524
Control MPC-F 6x45 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	45	96018525
Control MPC-F 2x55 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	55	96018527
Control MPC-F 3x55 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	55	96018528
Control MPC-F 4x55 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	55	96018529
Control MPC-F 5x55 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	55	96018530
Control MPC-F 6x55 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	55	96018531
Control MPC-F 2x75 SD, 3x380-415 V, 50-60 Hz	2	MPC-F	75	96018533
Control MPC-F 3x75 SD, 3x380-415 V, 50-60 Hz	3	MPC-F	75	96018534
Control MPC-F 4x75 SD, 3x380-415 V, 50-60 Hz	4	MPC-F	75	96018535
Control MPC-F 5x75 SD, 3x380-415 V, 50-60 Hz	5	MPC-F	75	96018536
Control MPC-F 6x75 SD, 3x380-415 V, 50-60 Hz	6	MPC-F	75	96018537

Control MPC-S

Type	Pumps		kW	Product number
Control MPC-S 2x0.37 DOL, 3x380-415 V, 50-60 Hz	2	MPC-S	0.37	96018616
Control MPC-S 3x0.37 DOL, 3x380-415 V, 50-60 Hz	3	MPC-S	0.37	96018617
Control MPC-S 4x0.37 DOL, 3x380-415 V, 50-60 Hz	4	MPC-S	0.37	96018618
Control MPC-S 5x0.37 DOL, 3x380-415 V, 50-60 Hz	5	MPC-S	0.37	96018619
Control MPC-S 6x0.37 DOL, 3x380-415 V, 50-60 Hz	6	MPC-S	0.37	96018620
Control MPC-S 2x0.55 DOL, 3x380-415 V, 50-60 Hz	2	MPC-S	0.55	96018622
Control MPC-S 3x0.55 DOL, 3x380-415 V, 50-60 Hz	3	MPC-S	0.55	96018623
Control MPC-S 4x0.55 DOL, 3x380-415 V, 50-60 Hz	4	MPC-S	0.55	96018624
Control MPC-S 5x0.55 DOL, 3x380-415 V, 50-60 Hz	5	MPC-S	0.55	96018625
Control MPC-S 6x0.55 DOL, 3x380-415 V, 50-60 Hz	6	MPC-S	0.55	96018626
Control MPC-S 2x0.75 DOL, 3x380-415 V, 50-60 Hz	2	MPC-S	0.75	96018628
Control MPC-S 3x0.75 DOL, 3x380-415 V, 50-60 Hz	3	MPC-S	0.75	96018629
Control MPC-S 4x0.75 DOL, 3x380-415 V, 50-60 Hz	4	MPC-S	0.75	96018630
Control MPC-S 5x0.75 DOL, 3x380-415 V, 50-60 Hz	5	MPC-S	0.75	96018631
Control MPC-S 6x0.75 DOL, 3x380-415 V, 50-60 Hz	6	MPC-S	0.75	96018632
Control MPC-S 2x1.1 DOL, 3x380-415 V, 50-60 Hz	2	MPC-S	1.1	96018634
Control MPC-S 3x1.1 DOL, 3x380-415 V, 50-60 Hz	3	MPC-S	1.1	96018635
Control MPC-S 4x1.1 DOL, 3x380-415 V, 50-60 Hz	4	MPC-S	1.1	96018636
Control MPC-S 5x1.1 DOL, 3x380-415 V, 50-60 Hz	5	MPC-S	1.1	96018637
Control MPC-S 6x1.1 DOL, 3x380-415 V, 50-60 Hz	6	MPC-S	1.1	96018638
Control MPC-S 2x1.5 DOL, 3x380-415 V, 50-60 Hz	2	MPC-S	1.5	96018640
Control MPC-S 3x1.5 DOL, 3x380-415 V, 50-60 Hz	3	MPC-S	1.5	96018641
Control MPC-S 4x1.5 DOL, 3x380-415 V, 50-60 Hz	4	MPC-S	1.5	96018642
Control MPC-S 5x1.5 DOL, 3x380-415 V, 50-60 Hz	5	MPC-S	1.5	96018643
Control MPC-S 6x1.5 DOL, 3x380-415 V, 50-60 Hz	6	MPC-S	1.5	96018644
Control MPC-S 2x2.2 DOL, 3x380-415 V, 50-60 Hz	2	MPC-S	2.2	96018646
Control MPC-S 3x2.2 DOL, 3x380-415 V, 50-60 Hz	3	MPC-S	2.2	96018647
Control MPC-S 4x2.2 DOL, 3x380-415 V, 50-60 Hz	4	MPC-S	2.2	96018648
Control MPC-S 5x2.2 DOL, 3x380-415 V, 50-60 Hz	5	MPC-S	2.2	96018649
Control MPC-S 6x2.2 DOL, 3x380-415 V, 50-60 Hz	6	MPC-S	2.2	96018650
Control MPC-S 2x3 DOL, 3x380-415 V, 50-60 Hz	2	MPC-S	3	96018652
Control MPC-S 3x3 DOL, 3x380-415 V, 50-60 Hz	3	MPC-S	3	96018653
Control MPC-S 4x3 DOL, 3x380-415 V, 50-60 Hz	4	MPC-S	3	96018654
Control MPC-S 5x3 DOL, 3x380-415 V, 50-60 Hz	5	MPC-S	3	96018655
Control MPC-S 6x3 DOL, 3x380-415 V, 50-60 Hz	6	MPC-S	3	96018656
Control MPC-S 2x4 DOL, 3x380-415 V, 50-60 Hz	2	MPC-S	4	96018658
Control MPC-S 3x4 DOL, 3x380-415 V, 50-60 Hz	3	MPC-S	4	96018659
Control MPC-S 4x4 DOL, 3x380-415 V, 50-60 Hz	4	MPC-S	4	96018660
Control MPC-S 5x4 DOL, 3x380-415 V, 50-60 Hz	5	MPC-S	4	96018661
Control MPC-S 6x4 DOL, 3x380-415 V, 50-60 Hz	6	MPC-S	4	96018662
Control MPC-S 2x5.5 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	5.5	96018664
Control MPC-S 3x5.5 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	5.5	96018665
Control MPC-S 4x5.5 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	5.5	96018666
Control MPC-S 5x5.5 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	5.5	96018667
Control MPC-S 6x5.5 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	5.5	96018668
Control MPC-S 2x7.5 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	7.5	96018670
Control MPC-S 3x7.5 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	7.5	96018671
Control MPC-S 4x7.5 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	7.5	96018672
Control MPC-S 5x7.5 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	7.5	96018673
Control MPC-S 6x7.5 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	7.5	96018674
Control MPC-S 2x11 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	11	96018676
Control MPC-S 3x11 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	11	96018677
Control MPC-S 4x11 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	11	96018678
Control MPC-S 5x11 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	11	96018679
Control MPC-S 6x11 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	11	96018680
Control MPC-S 2x15 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	15	96018682
Control MPC-S 3x15 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	15	96018683
Control MPC-S 4x15 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	15	96018684
Control MPC-S 5x15 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	15	96018685
Control MPC-S 6x15 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	15	96018686
Control MPC-S 2x18.5 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	18.5	96018688
Control MPC-S 3x18.5 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	18.5	96018689
Control MPC-S 4x18.5 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	18.5	96018690
Control MPC-S 5x18.5 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	18.5	96018691
Control MPC-S 6x18.5 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	18.5	96018692
Control MPC-S 2x22 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	22	96018694
Control MPC-S 3x22 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	22	96018695
Control MPC-S 4x22 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	22	96018696

Type	Pumps		kW	Product number
Control MPC-S 5x22 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	22	96018697
Control MPC-S 6x22 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	22	96018698
Control MPC-S 2x30 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	30	96018700
Control MPC-S 3x30 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	30	96018701
Control MPC-S 4x30 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	30	96018702
Control MPC-S 5x30 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	30	96018703
Control MPC-S 6x30 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	30	96018704
Control MPC-S 2x37 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	37	96018706
Control MPC-S 3x37 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	37	96018707
Control MPC-S 4x37 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	37	96018708
Control MPC-S 5x37 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	37	96018709
Control MPC-S 6x37 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	37	96018710
Control MPC-S 2x45 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	45	96018712
Control MPC-S 3x45 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	45	96018713
Control MPC-S 4x45 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	45	96018714
Control MPC-S 5x45 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	45	96018715
Control MPC-S 6x45 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	45	96018716
Control MPC-S 2x55 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	55	96018718
Control MPC-S 3x55 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	55	96018719
Control MPC-S 4x55 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	55	96018720
Control MPC-S 5x55 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	55	96018721
Control MPC-S 6x55 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	55	96018722
Control MPC-S 2x75 SD, 3x380-415 V, 50-60 Hz	2	MPC-S	75	96018724
Control MPC-S 3x75 SD, 3x380-415 V, 50-60 Hz	3	MPC-S	75	96018725
Control MPC-S 4x75 SD, 3x380-415 V, 50-60 Hz	4	MPC-S	75	96018726
Control MPC-S 5x75 SD, 3x380-415 V, 50-60 Hz	5	MPC-S	75	96018727
Control MPC-S 6x75 SD, 3x380-415 V, 50-60 Hz	6	MPC-S	75	96018728

MP 204 control panels

Component	Description	Product number
Direct on-line	Control MP 204 1x3-5A DOL-II	97758179
	Control MP 204 1x5-8A DOL-II	97758180
	Control MP 204 1x8-13A DOL-II	97758231
	Control MP 204 1x13-21A DOL-II	97758232
	Control MP 204 1x21-28A DOL-II	97758233
	Control MP 204 1x28-34A DOL-II	97758234
	Control MP 204 1x34-43A DOL-II	97758235
	Control MP 204 1x43-53A DOL-II	97758236
	Control MP 204 1x53-68A DOL-II	97758237
	Control MP 204 1x68-85A DOL-II	97758238
	Control MP 204 1x85-103A DOL-II	97758239
Star/delta	Control MP 204 1x3-5A SD-II	97758240
	Control MP 204 1x5-8A SD-II	97758241
	Control MP 204 1x8-13A SD-II	97758242
	Control MP 204 1x13-21A SD-II	97758243
	Control MP 204 1x21-28A SD-II	97758244
	Control MP 204 1x28-34A SD-II	97758245
	Control MP 204 1x34-43A SD-II	97758246
	Control MP 204 1x43-53A SD-II	97758247
	Control MP 204 1x53-68A SD-II	97758248
	Control MP 204 1x68-85A SD-II	97758249
	Control MP 204 1x85-103A SD-II	97758250
Soft starter	Control MP 204 1x3-5A SS-II	97758251
	Control MP 204 1x5-8A SS-II	97758252
	Control MP 204 1x8-13A SS-II	97758253
	Control MP 204 1x13-21A SS-II	97758254
	Control MP 204 1x21-28A SS-II	97758255
	Control MP 204 1x28-34A SS-II	97758256
	Control MP 204 1x34-43A SS-II	97758257
	Control MP 204 1x43-53A SS-II	97758258
	Control MP 204 1x53-68A SS-II	97758259
	Control MP 204 1x68-85A SS-II	97758260
	Control MP 204 1x85-103A SS-II	97758261

LC/LCD 107

Description	Operating current per pump [A]	Product number				
		Grundfos product No	Hour counter available	Start counter available	Combined hour and start counter available	SMS unit available
LC 107 controller, pneumatic version with level bells and tube for 1 pump, 1 x 230 V, direct-on-line starting. With built-in start and operating capacitors (150/30 µF) for SEG pumps.	3.2 - 12.0	96841811	Yes *	Yes *	Yes *	Yes *
LC 107 controller, pneumatic version with level bells and tube for 1 pump, 1 x 230 V, direct-on-line starting. With built-in start and operating capacitors (60/30 µF) for SEG pumps.	3.2 - 12.0	96841809	96841810	Yes *	Yes *	Yes *
LC 107 controller, pneumatic version with level bells and tube for 1 pump, 1 x 230 V, direct-on-line starting. With built-in operating capacitors (30 µF) for SEG pumps.	3.2 - 12.0	96841808	Yes *	Yes *	Yes *	Yes *
LC 107 controller, pneumatic version with level bells and tube for 1 pump, 1 x 230 V, direct-on-line starting.	1.0 - 5.0	96841806	Yes *	Yes *	Yes *	Yes *
	3.2 - 12.0	96841807	Yes *	Yes *	Yes *	Yes *
LC 107 controller, pneumatic version with level bells and tube for 1 pump, 3 x 400 V, direct-on-line starting.	1.0 - 5.0	96841832	Yes *	Yes *	Yes *	Yes *
	3.2 - 12.0	96841834	Yes *	Yes *	Yes *	Yes *
	6.0 - 23.0	96841835	Yes *	Yes *	Yes *	Yes *
LCD 107 controller, pneumatic version with level bells and tube for pumps, 1 x 230 V, direct-on-line starting. With built-in start and operating capacitors (150/30 µF) for SEG pumps.	3.2 - 12.0	96841840	Yes *	Yes *	Yes *	Yes *
LCD 107 controller, pneumatic version with level bells and tube for pumps, 1 x 230 V, direct-on-line starting. With built-in start and operating capacitors (60/30 µF) for SEG pumps.	3.2 - 12.0	96841839	Yes *	Yes *	Yes *	Yes *
LCD 107 controller, pneumatic version with level bells and tube for pumps, 1 x 230 V, direct-on-line starting. With built-in operating capacitors (30 µF) for SEG pumps.	3.2 - 12.0	96841838	Yes *	Yes *	Yes *	Yes *
LCD 107 controller, pneumatic version with level bells and tube for pumps, 1 x 230 V, direct-on-line starting.	1.0 - 5.0	96841836	Yes *	Yes *	Yes *	Yes *
	3.2 - 12.0	96841837	Yes *	Yes *	Yes *	Yes *
LCD 107 controller, pneumatic version with level bells and tube for pumps, 3 x 400 V, direct-on-line starting.	1.0 - 5.0	96841841	Yes *	Yes *	Yes *	Yes *
	3.2 - 12.0	96841842	Yes *	Yes *	Yes *	Yes *
	6.0 - 23.0	96841843	Yes *	Yes *	Yes *	Yes *

* See accessories.

Accessories for LC/LCD 107

Picture	Description	Product number
	Black pneumatic tube, 20 metres.	96431614
	Red pneumatic tube, 20 metres.	96431615
	White pneumatic tube, 20 metres.	96431616

LC/LCD 108

Description	Operating current per pump [A]	Product number				
		Grundfos product No	Hour counter available	Start counter available	Combined hour and start counter available	SMS unit available
LC 108 controller, for float switches for 1 pump, 1 x 230 V, direct-on-line starting. With built-in start and operating capacitors (150/30 µF) for SEG pumps.	3.2 - 12.0	96841852 (GB/D/PL/NL)	96841853 (GB/D/PL/NL)	Yes *	Yes *	Yes *
		96841881 (GB/GR/II/F/E)	96841882 (GB/GR/II/F/E)			
		96841910 (GB/DK/S/RU)	96841911 (GB/DK/S/RU)			
LC 108 controller, for float switches for 1 pump, 1 x 230 V, direct-on-line starting. With built-in operating capacitors (30 µF) for SEG pumps.	3.2 - 12.0	96841851 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841880 (GB/GR/II/F/E)				
		96841909 (GB/DK/S/RU)				
LC 108 controller for float switches for 1 pump, 1 x 230 V, direct-on-line starting.	1.0 - 5.0	96841844 (GB/D/PL/NL)	96841845 (GB/D/PL/NL)	Yes *	96841846 (GB/D/PL/NL)	Yes *
		96841873 (GB/GR/II/F/E)	96841874 (GB/GR/II/F/E)		96841875 (GB/GR/II/F/E)	
		96841902 (GB/DK/S/RU)	96841903 (GB/DK/S/RU)		96841904 (GB/DK/S/RU)	
	3.2 - 12.0	96841847 (GB/D/PL/NL)	96841848 (GB/D/PL/NL)	96841849 (GB/D/PL/NL)	96841850 (GB/D/PL/NL)	Yes *
		96841876 (GB/GR/II/F/E)	96841877 (GB/GR/II/F/E)	96841878 (GB/GR/II/F/E)	96841879 (GB/GR/II/F/E)	
		96841905 (GB/DK/S/RU)	96841906 (GB/DK/S/RU)	96841907 (GB/DK/S/RU)	96841908 (GB/DK/S/RU)	
	6.0 - 23.0	96841854 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841883 (GB/GR/II/F/E)				
		96841912 (GB/DK/S/RU)				
LC 108 controller for float switches for 1 pump, 3 x 230 V, direct-on-line starting.	1.0 - 5.0	96841855 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841884 (GB/GR/II/F/E)				
		96841913 (GB/DK/S/RU)				
	3.2 - 12.0	96841856 (GB/D/PL/NL)	Yes *	Yes *	96841857 (GB/D/PL/NL)	Yes *
		96841885 (GB/GR/II/F/E)			96841886 (GB/GR/II/F/E)	
		96841914 (GB/DK/S/RU)			96841915 (GB/DK/S/RU)	
	6.0 - 23.0	96841858 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841887 (GB/GR/II/F/E)				
		96841916 (GB/DK/S/RU)				
LC 108 controller for float switches for 1 pump, 3 x 400 V, direct-on-line starting.	1.0 - 5.0	96841859 (GB/D/PL/NL)	96841860 (GB/D/PL/NL)	Yes *	96841861 (GB/D/PL/NL)	Yes *
		96841888 (GB/GR/II/F/E)	96841889 (GB/GR/II/F/E)		96841890 (GB/GR/II/F/E)	
		96841917 (GB/DK/S/RU)	96841918 (GB/DK/S/RU)		96841919 (GB/DK/S/RU)	
	3.2 - 12.0	96841863 (GB/D/PL/NL)	96841865 (GB/D/PL/NL)	96841864 (GB/D/PL/NL)	96841866 (GB/D/PL/NL)	Yes *
		96841892 (GB/GR/II/F/E)	96841894 (GB/GR/II/F/E)	96841893 (GB/GR/II/F/E)	96841895 (GB/GR/II/F/E)	
		96841921 (GB/DK/S/RU)	96841923 (GB/DK/S/RU)	96841922 (GB/DK/S/RU)	96841924 (GB/DK/S/RU)	
	6.0 - 23.0	96841867 (GB/D/PL/NL)	Yes *	Yes *	96841868 (GB/D/PL/NL)	Yes *
		96841896 (GB/GR/II/F/E)			96841897 (GB/GR/II/F/E)	
		96841925 (GB/DK/S/RU)			96841926 (GB/DK/S/RU)	

Description	Operating current per pump [A]	Product number				
		Grundfos product No	Hour counter available	Start counter available	Combined hour and start counter available	SMS unit available
LC 108 controller for float switches for 1 pump, 3 x 400 V, star-delta starting.	5.5 - 20.0	96841869 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841898 (GB/GR/II/F/E)				
		96841927 (GB/DK/S/RU)				
		96841870 (GB/D/PL/NL)				
	10.0 - 30.0	96841899 (GB/GR/II/F/E)	Yes *	Yes *	Yes *	Yes *
		96841928 (GB/DK/S/RU)				
		96841871 (GB/D/PL/NL)				
		96841900 (GB/GR/II/F/E)				
	15.5 - 59.0	96841929 (GB/DK/S/RU)	Yes *	Yes *	Yes *	Yes *
		96841872 (GB/D/PL/NL)				
		96841901 (GB/GR/II/F/E)				
		96841930 (GB/DK/S/RU)				
LCD 108 controller for float switches for 2 pumps, 1 x 230 V, direct-on-line starting. With built-in start and operating capacitors (150/30 µF) for SEG pumps.	3.2 - 12.0	96841933 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841960 (GB/GR/II/F/E)				
		96841987 (GB/DK/S/RU)				
		96841934 (GB/D/PL/NL)				
LCD 108 controller, for float switches for 2 pumps, 1 x 230V, direct-on-line starting. With built-in operating capacitors (30 µF) for SEG pumps.	3.2 - 12.0	96841958 (GB/GR/II/F/E)	Yes *	Yes *	Yes *	Yes *
		96841985 (GB/DK/S/RU)				
		96841932 (GB/D/PL/NL)				
		96841959 (GB/GR/II/F/E)				
LCD 108 controller for float switches for 2 pumps, 1 x 230 V, direct-on-line starting. With built-in start and operating capacitors (60/30 µF) for SEG pumps.	3.2 - 12.0	96841986 (GB/DK/S/RU)	Yes *	Yes *	Yes *	Yes *
		96841935 (GB/D/PL/NL)				
		96841962 (GB/GR/II/F/E)				
		96841989 (GB/DK/S/RU)				
LCD 108 controller for float switches for 2 pumps, 3 x 230 V, direct-on-line starting.	1.0 - 5.0	96841936 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841963 (GB/GR/II/F/E)				
		96841990 (GB/DK/S/RU)				
		96841937 (GB/D/PL/NL)				
	3.2 - 12.0	96841939 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841965 (GB/GR/II/F/E)				
		96841992 (GB/DK/S/RU)				
		96841940 (GB/D/PL/NL)				
	6.0 - 23.0	96841967 (GB/GR/II/F/E)	Yes *	Yes *	Yes *	Yes *
		96841994 (GB/DK/S/RU)				
		96841941 (GB/D/PL/NL)				
		96841968 (GB/GR/II/F/E)				
LCD 108 controller for float switches for 2 pumps, 3 x 400 V, direct-on-line starting.	1.0 - 5.0	96841942 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841969 (GB/GR/II/F/E)				
		96841996 (GB/DK/S/RU)				
		96841943 (GB/D/PL/NL)				
	3.2 - 12.0	96841975 (GB/GR/II/F/E)	Yes *	Yes *	Yes *	Yes *
		96842002 (GB/DK/S/RU)				
		96841948 (GB/D/PL/NL)				
		96841976 (GB/GR/II/F/E)				
	6.0 - 23.0	96841951 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841978 (GB/GR/II/F/E)				
		96842005 (GB/DK/S/RU)				
		96841952 (GB/D/PL/NL)				

Description	Operating current per pump [A]	Product number				
		Grundfos product No	Hour counter available	Start counter available	Combined hour and start counter available	SMS unit available
LCD 108 controller for float switches for 2 pumps, 3 x 400 V, star-delta starting	5.5 - 20.0	96841954 (GB/D/PL/NL)	Yes *	Yes *	Yes *	Yes *
		96841981 (GB/GR//F/E)				
		96842008 (GB/DK/S/RU)				
		96841955 (GB/D/PL/NL)				
	10.0 - 30.0	96841982 (GB/GR//F/E)	Yes *	Yes *	Yes *	Yes *
		96842009 (GB/DK/S/RU)				
		96841956 (GB/D/PL/NL)				
		96841983 (GB/GR//F/E)				
	15.5 - 59.0	96842010 (GB/DK/S/RU)	Yes *	Yes *	Yes *	Yes *
		96841957 (GB/D/PL/NL)				
		96841984 (GB/GR//F/E)				
		96842011 (GB/DK/S/RU)				

* See accessories.

Accessories for LC/LCD 108

No	Picture	Description	Product number	
1		Float switch with 10 m cable.	For LC 108 and LCD 108 controllers	96003332
		Float switch with 20 m cable.		96003695
		Float switch for potentially explosive environments, with 10 m cable.	For LC 108 and LCD 108 controllers connected to LC-Ex4	96003421
		Float switch for potentially explosive environments, with 20 m cable.		96003536
2		Bracket for float switch.	96003338	
3		Standard float switches with 10 m cable and bracket.	1 pump without alarm (2 switches)	62500013
			1 pump with alarm (3 switches)	62500014
			2 pumps without alarm (3 switches)	62500014
			2 pumps with alarm (4 switches)	62500015
4		Float switches for potentially explosive environments, w/10 m cable and bracket. One switch is always used for dry-running protection in explosion-proof applications.	1 pump without alarm (3 switches)	62500017
			1 pump with alarm (4 switches)	62500018
			2 pumps without alarm (4 switches)	62500018
5		LC-Ex4 safety barrier for potentially explosive float-switch applications. To be used with float switches for potentially explosive applications only. The LC-Ex4 can be mounted in ambient temperatures ranging from -25 °C to +50 °C. Safety class: II (1) G [Ex ia] II C.	96440300	

LC/LCD 110

Description	Operating current per pump [A]	Product number				
		Grundfos product No	Hour counter available	Start counter available	Combined hour and start counter available	SMS unit available
LC 110 controller for electrodes for 1 pump, 1 x 230 V, direct online starting. With built-in operating capacitors (30 µF) for SEG pumps.	3.2 - 12.0	96842057	Yes *	Yes *	Yes *	Yes *
LC 110 controller for electrodes for 1 pump, 1 x 230 V, direct-on-line starting.	1.0 - 5.0	96842054	96842055	Yes *	Yes *	Yes *
	3.2 - 12.0	96842056	Yes *	Yes *	Yes *	Yes *
	6.0 - 23.0	96842060	Yes *	Yes *	Yes *	Yes *
LC 110 controller for electrodes for 1 pump, 3 x 400 V, direct-on-line starting.	1.0 - 5.0	96842061	96842062	Yes *	Yes *	Yes *
	3.2 - 12.0	96842064	96842065	Yes *	Yes *	Yes *
	6.0 - 23.0	96842066	Yes *	Yes *	Yes *	Yes *
LCD 110 controller for electrodes for 2 pumps, 1 x 230 V, direct online starting. With built-in start and operating capacitors (150/30 µF) for SEG pumps.	3.2 - 12.0	96842071	Yes *	Yes *	Yes *	Yes *
LCD 110 controller for electrodes for 2 pumps, 1 x 230 V, direct online starting. With built-in operating capacitors (30 µF) for SEG pumps.	3.2 - 12.0	96842070	Yes *	Yes *	Yes *	Yes *
LCD 110 controller for electrodes for 2 pumps, 1 x 230 V, direct-on-line starting.	1.0 - 5.0	96842067	96842068	Yes *	Yes *	Yes *
	3.2 - 12.0	96842069	Yes *	Yes *	Yes *	Yes *
	6.0 - 23.0	-	-	-	-	-
LCD 110 controller for electrodes for 2 pumps, 3 x 400 V, direct-on-line starting.	1.0 - 5.0	96842080	96842081	Yes *	96842084	Yes *
	3.2 - 12.0	96842087	96842088	Yes *	Yes *	Yes *
	6.0 - 23.0	96842094	Yes *	Yes *	Yes *	Yes *
LCD 108 controller for float switches for 2 pumps, 3 x 230 V, star-delta starting.	10.0 - 21.0	96842096	Yes *	Yes *	Yes *	Yes *
	15.5 - 55.0	96842097	Yes *	Yes *	Yes *	Yes *
LCD 108 controller for float switches for 2 pumps, 3 x 230 V, star-delta starting.	10.0 - 21.0	96842098	Yes *	Yes *	Yes *	Yes *
	10.0 - 30.0	96842123	Yes *	Yes *	Yes *	Yes *

* See accessories.

Accessories for LC/LCD 110

Picture	Description	Product number
	Bracket for electrodes	91713196
	1 electrode with 10 m cable	96076289
	3 electrodes with 10 m cable	96076189
	4 electrodes with 10 m cable	91713437

CUE

Mains supply 3 x 380-500 V

Typical shaft power P2		Maximum output current [A]		Maximum input current [A]		Enclosure				Maximum conductor cross-section ¹⁾		Efficiency
[kW]	[HP]	3 x 380-440 V	3 x 441-500 V	3 x 380-440 V	3 x 441-500 V	IP20	IP21	IP54	IP55	[mm ²]	AWG	
0.55	0.75	1.8	1.6	1.6	1.4	A2	-	-	A4	4	10	0.95
0.75	1	2.4	2.1	2.2	1.9		-	-		4	10	0.96
1.1	1.5	3	2.7	2.7	2.7		-	-		4	10	0.96
1.5	2	4.1	3.4	3.7	3.1		-	-		4	10	0.97
2.2	3	5.6	4.8	5	4.3		-	-		4	10	0.97
3	4	7.2	6.3	6.5	5.7		-	-		4	10	0.97
4	5	10	8.2	9	7.4	A3	-	-	A5	4	10	0.97
5.5	7.5	13	11	11.7	9.9		-	-		4	10	0.97
7.5	10	16	14.5	14.4	13	B3	-	-	B1	10	7	0.98
11	15	24	21	22	19		-	-		10	7	0.98
15	20	32	27	29	25		-	-		10	7	0.98
18.5	25	37.5	34	34	31	B4	-	-	B2	35	2	0.98
22	30	44	40	40	36		-	-		35	2	0.98
30	40	61	52	55	47	C3	-	-	C1	50	1/0	0.98
37	50	73	65	66	59		-	-		50	1/0	0.98
45	60	90	80	82	73	C4	-	-	C2	50	1/0	0.98
55	75	106	105	96	95		-	-		95	4/0	0.98
75	100	147	130	133	118	C4	-	-	C2	120	250 MCM	0.98
90	125	177	160	161	145		-	-		120	250 MCM	0.99

Typical shaft power P2		Maximum output current [A]		Maximum input current [A]		Enclosure				Maximum conductor cross-section ¹⁾		Efficiency
[kW]	[HP]	3 x 400 V	3 x 460-500 V	3 x 400 V	3 x 460-500 V	IP20	IP21	IP54	IP55	[mm ²]	AWG	
110	150	212	190	204	183	-	D1	D1	-	2 x 70	2 x 2/0	0.98
132	200	260	240	251	231	-	-	-	-	2 x 70	2 x 2/0	0.98
160	250	315	302	304	291	-	-	-	-	2 x 185	2 x 350 MCM	0.98
200	300	395	361	381	348	-	D2	D2	-	2 x 185	2 x 350 MCM	0.98
250	350	480	443	463	427	-	-	-	-	2 x 185	2 x 350 MCM	0.98

Typical shaft power P2		CUE				Output filter IP20	
[kW]	[HP]	IP20	IP21	IP54	IP55	dU/dt	Sine-wave
0.55	0.75	96754675	-	-	97685238	-	96754941
0.75	1	96754676	-	-	97685239	-	96754941
1.1	1.5	96754677	-	-	97685240	-	96754972
1.5	2	96754678	-	-	97685251	-	96754972
2.2	3	96754679	-	-	97685252	-	96754973
3	4	96754680	-	-	97685253	-	96754973
4	5	96754681	-	-	97685254	-	96754974
5.5	7.5	96754692	-	-	97749852	-	96754976
7.5	10	96754693	-	-	97749853	-	96754976
11	15	96754694	-	-	97749854	97669799	96754977
15	20	96754695	-	-	97749855	97669799	96754978
18.5	25	96754696	-	-	97749856	97669799	96754978
22	30	96754697	-	-	97749857	97669799	96755019
30	40	96754698	-	-	97749858	97669869	96755021
37	50	96754699	-	-	96754728	97669869	96755032
45	60	96754700	-	-	96754729	97669869	96755033
55	75	96754701	-	-	96754730	97669896	96755033
75	100	96754702	-	-	96754731	97669902	96755034
90	125	96754703	-	-	96754732	97669902	96755034
110	150	-	96754649	96754666	-	97669905	96755037
132	200	-	96754651	96754669	-	97669905	96755037
160	250	-	96754662	96754671	-	97669905	96755038
200	300	-	96754663	96754672	-	97669906	96755038
250	350	-	96754665	96754673	-	97669906	96755039

Dimensions and weight of output filters

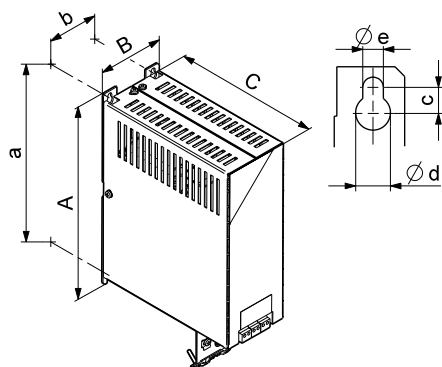


Fig. 48 Wall mounting

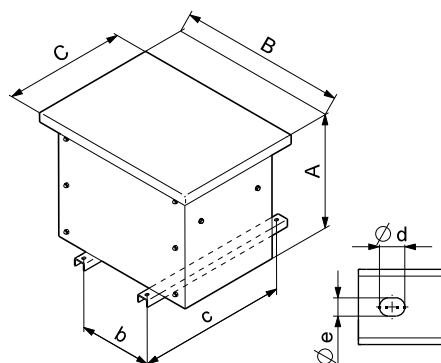


Fig. 49 Floor mounting

Product number	Mounting	Height [mm]		Width [mm]		Depth [mm]		Screw holes [mm]			Weight [kg]
		A	a	B	b	C	c	Ød	Øe	f	
Sine-wave filters											
96754941	Wall	200	190	75	60	205	-	8	4.5	7	3.3
96754972	Wall	200	190	75	60	205	-	8	4.5	7	4.2
96754973	Wall	268	257	90	70	206	-	11	6.5	8	5.8
96754974	Wall	268	257	90	70	205	-	11	6.5	8	7.1
96754976	Wall	268	257	130	90	205	-	11	6.5	8	9.1
96754977	Wall	330	312	150	120	260	-	19	9	12	16.9
96754978	Wall	430	412	150	120	260	-	19	9	12	19.9
96755019	Wall	530	500	170	125	260	-	19	9	12	39
96755021	Wall	610	580	170	125	260	-	19	9	12	41
96755032	Wall	610	580	170	135	260	-	19	9	12	54
96755033	Floor	522	-	670	290	500	460	15	11	-	87
96755034	Floor	782	-	940	400	650	610	15	11	-	113
96755037	Floor	782	-	940	400	650	610	15	11	-	190
96755038	Floor	782	-	940	430	650	610	15	11	-	245
96755039	Floor	742	-	1050	430	760	720	15	11	-	310
96755040	Wall	430	412	150	120	260	-	19	9	12	16.7
96755041	Floor	522	-	670	220	500	460	15	11	-	55
96755042	Floor	522	-	670	260	500	460	15	11	-	70
96755043	Floor	522	-	670	310	500	460	15	11	-	105
96755044	Floor	522	-	640	380	500	460	15	11	-	150
96755045	Floor	782	-	910	430	650	610	15	11	-	220
96755047	Floor	782	-	940	500	650	610	15	11	-	285
96755049	Floor	1152	-	1290	490	800	760	15	11	-	370
96755050	Floor	1152	-	1290	540	800	760	-	-	-	550
dU/dt filters											
96755062	Wall	268	257	120	90	205	-	11	6.5	8	5.2
96755063	Wall	330	312	170	125	260	-	19	9	12	9.3
96755064	Wall	330	312	170	125	260	-	19	9	12	10.7
96755066	Wall	330	312	170	125	260	-	19	9	12	12.8
96755067	Floor	462	-	610	175	440	400	15	11	-	33
96755069	Floor	463	-	610	190	440	400	15	11	-	50
96755070	Floor	571	-	770	190	550	510	15	11	-	60
96755071	Floor	522	-	670	215	500	460	15	11	-	58
96755078	Wall	-	300	150	120	260	-	19	9	12	8.3
96755079	Wall	-	312	170	125	260	-	19	9	12	9.4
96755080	Wall	330	312	170	125	260	-	19	9	12	11.8
96755081	Wall	330	312	170	125	260	-	19	9	12	12.2
96755082	Floor	522	-	670	215	500	460	15	11	-	45
96755083	Floor	522	-	640	215	500	460	15	11	-	47
96755084	Floor	522	-	670	215	500	460	15	11	-	47
96755085	Floor	522	-	670	215	500	460	15	11	-	52
97669799	Wall	370	279	118	85	242	11.5	13	6.2	6	6.3
97669869	Wall	475	379	157	125	248	11.5	13	6.2	6	16.2
97669896	Wall	475	379	158	125	248	11.5	13	6.2	6	25.5
97669902	Wall	525	429	188	155	335	11.5	13	6.2	6	30
97669905	Floor	620	-	425	325	700	660	-	13	17	64.5
97669906	Floor	620	-	425	325	700	660	-	13	17	67.5
97689248	Floor	620	-	425	325	700	660	-	13	17	78.5

MP 204

Component	Description	Product number
	Electronic motor protection for pumps. One unit for all electrical motors, from 3-999 A.	96079927

Component	Description	Functions	Product number
Current transformer MP 204 accessory 	The current transformers are accessories for the Grundfos MP 204 motor protector. At motor currents above 120 A and up to and including 1000 A, current transformers must be used.	The current transformers transform the actual motor current into a lower measuring current for the MP 204. Example: CT 200/5. Actual motor current: 100 A. Measuring current for the MP 204: 2.5 A. • CT assembly 200/5 • CT assembly 300/5 • CT assembly 500/5 • CT assembly 750/5 • CT assembly 1000/5. Note: Each package contains three transformers.	96095281 96095282 96095283 96095284 96095285

PC Tool Link

	The PC Tool Link is used to establish local communication between a service PC and the CU 362. The PC Tool Link is used together with the Grundfos PC Tools.	The PC Tool Link package includes all necessary items to connect the Grundfos product and the PC. The PC Tool Link suitcase contains: • PC Tool Link • standard USB cable • TTL cable • RS-485 cable • RS-232 cable (crossed) • adapter.	96705378
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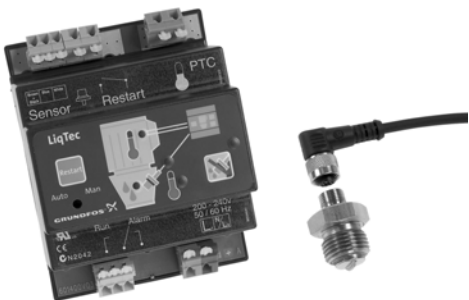
IO 113

Component	Description	Product number
	The IO 113 forms interface between a Grundfos wastewater pump with analog and digital sensors and the pump controller.	The two variants:
		98097391 standard variant
		98097390 variant with communication module

SM 113

Component	Description	Product number
	Variant with communication module for SM 113 connection.	98149751 standard variant

Liqtec

Component	Description	Product number
	The LiqTec - protects the pump against dry-running. - protects the pump against too high liquid temperature (130 °C ±5 °C). - can monitor the motor temperature if the PTC sensor in the motor has been connected. - has a fail-safe design. If the sensor, sensor cable, electronic unit or power supply fails, the pump stops immediately.	96443676

MAPE

Component	Description	Product number
	MAP can detect 1) Moisture incursion to the junction box 2) Over heat of stator windings (U,V,W) 3) High temperature of the bearing (Upper and Lower) 4) Seal leakage	96922604

Dedicated Controls

Component	Description	Product number
	The CU 362 is the 'brain' of the Dedicated Controls system and is mounted in the front of the control cabinet.	96787482
	The IO 351B is a general I/O module. The IO 351B communicates with the CU 362 via GENIbus.	96161730
	The battery is connected to the CU 362 as backup in case of power cuts.	96079948

Communication

Overview of Grundfos CIM/CIU data communication interfaces

CIM (Communication Interface Modules)	CIM/CIU product No	UPE FZ***/ MAGNA*	MAGNA 3 (single)	E-Pumps < 11 kW	E-pumps 11-22 kW	CUE	MPC (CU 351)*	Multi-E	CR Monitor*	MP 204	Dedicated Controls (CU 362)	Multi-B	WW-AUTO _{ADAPT}	SQFlex	DDA Digital Dosing
CIM 050 GENIbus	96824631		•	built-in GENI	•						•	•	CIM 050 + CIU 902		built-in GENI
CIM 100 LON	96824797		•		•										
CIM 110 LON (MPC)	96824798											•			
CIM 150 Profibus	96824793		•		•						•		CIM 150 + CIU 902		
E-Box 150 Profibus	97513994														•
CIM 200 Modbus / COMLI	96824796		•		•						•	•			
CIM 250 GSM/GPRS	96824795		•		•						•				
CIM 270 GRM**	96898815		•		•						•	•			
CIM 300 BACnet	96893770		•		•							•			
CIU (Communication Interface Modules)	CIM/CIU product No	UPE FZ***/ MAGNA*	MAGNA 3 (single)	E-Pumps < 11 kW	E-pumps 11-22 kW	CUE	MPC (CU 351)*	Multi-E	CR Monitor*	MP 204	Dedicated Controls (CU 362)	Multi-B	WW-AUTO _{ADAPT}	SQFlex	DDA Digital Dosing
CIU 100 LON	96753735	•		•		•		•							
CIU 110 LON (MPC)	96753736						•								
CIU 150 Profibus	96753081	•		•		•	•	•	•	•					•
CIU 152 Profibus AUTO _{ADAPT}	98128063												•		
CIU 200 Modbus / COMLI	96753082	•		•		•	•	•	•	•					
CIU 202 Modbus AUTO _{ADAPT} / COMLI	97644728												•		
CIU 250 GSM/GPRS	96787106	•		•		•	•	•	•	•					
CIU 252 GSM/GPRS AUTO _{ADAPT}	97644729												•		
CIU 271 GRM**	96898819	•		•		•	•	•	•	•					•
CIU 272 GRM AUTO _{ADAPT} **	97644730												•		
CIU 273 GRM**	97980341													•	
CIU 300 BACnet	96893769	•		•		•	•	•							
CIU 902 IR (R100) AUTO _{ADAPT}	97644690												•		

* Extra GENIbus module required.

** GRM contract needed for data hosting in GRM.

*** UPE pumps: Only versions 80-120 FZ and 100-120 FZ are supported by the CIM/CIU products.

Note: CIM/CIU 25X/27X does not include antenna, but the following can be used: Antenna, Roof (97631956) or Antenna, Desk (97631957).

Please note that this list is subject to changes without prior notice.

Grundfos GO

Component	Description	Product number
	MI 201 iPod touch with dongle and cover.	98140638
	MI 202 iPhone dongle.	98046376
	MI 301 Universal dongle.	98046408
	Cover for MI 201 Cover for iPod touch.	98140983

Sensors

	Product name	Cable length [m]	Product number
	1 float switch MS1	10	96003332
	1 float switch MS1	20	96003695
	1 float switch MS1	30	91073205
	2 float switches MS1, w. wallhanger	10	62500013
	3 float switches MS1, w. wallhanger	10	62500014
	4 float switches MS1, w. wallhanger	10	62500015

TM05 2721 0412

	Product name	Cable length [m]	Product number
	1 float switch MS1 elec. Ex	10	96003421
	1 float switch MS1 elec. Ex	20	96003536
	1 float switch MS1 elec. Ex	30	91072782
	2 float switches MS1 elec. Ex	10	62500016
	3 float switches MS1 elec. Ex	10	62500017
	4 float switches MS1 elec. Ex	10	62500018

TM05 2722 0412

	Product name	Cable length [m]	Product number
	1 float switch MS1 C	10	96652869

TM05 2723 0412

	Product name	Product number
	Cable support for 2 float switches	96003338

TM05 2724 0412

MPS

All products include a cable hanger.

Product name	Measuring range [bar / m]	Cable length [m]	Comment	Product number
MPS 0.5 bar with 10 m cable	0.5 / 5	10		96377410
MPS 0.5 bar with 25 m cable	0.5 / 5	25		97719345
MPS 1 bar with 25 m cable	1 / 10	25		97719347
MPS 1 bar with 50 m cable	1 / 10	50		97719348
MPS 1 bar with 100 m cable	1 / 10	100		97719349
MPS 5 bar with 60 m cable	5 / 50	60		97719350
MPS 5 bar with 100 m cable	5 / 50	100	Drinking water approval	97719351
MPS 10 bar with 120 m cable	10 / 120	120		97719352
MPS 16 bar with 200 m cable	16 / 160	200		97719353
MPS 16 bar with 250 m cable	16 / 160	250		97719354
Junction box				96377411

Product data

Pressure transmitter

Measuring principle	Piezo-resistive
Measuring variable	Hydrostatic level
Measuring range	0.5 bar (5 mH ₂ O)
Output	4-20 mA
Power supply	10-36 V DC
Accuracy	0.3 % of full-scale value
Degree of protection	IP68

Temperature

Process	-10 ... +80 °C
Storage	-40 ... +100 °C

Weight

Pressure transmitter	0.4 kg
Cable	0.08 kg/m

Drinking water approval

Drinking water approval	WRAS & ACS
-------------------------	------------

Material

Seal diaphragm	Stainless steel 1.4571/316 Ti
Casing	Stainless steel 1.4571/316 Ti
Gasket	Vitron
Connecting cable...	PE/HFFR sheath (non-halogen)

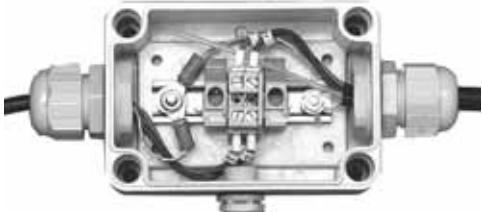
Junction box

Electrical connection	2 x 3-way (28...18 AWG)
Cable entry	2 pcs. M20 x 1.5
Enclosure material	Polycarbonate
Degree of protection	IP54
Weight	0.2 kg

Cable hanger

Material	Galvanised steel, polyamide
Weight	0.16 kg

Junction box for MPS sensor

Component	Description	Product number
	Junction box for sensor cable. Sensor cable junction box with built-in screw terminals and vent valve to balance the ambient pressure.	96377411

LU probe

Component	Description	Product number
	The ultrasonic level transmitter is a loop-powered continuous level transmitter. The level transmitter enables constant level detection.	96693767 (transmitter)
	Note: The level transmitter must be set up via a hand-held programmer.	96693768 (programmer)

MBS 3000 compact design

Grundfos product No	Danfoss code number	Pressure range	Pressure connection	Pressure sensor	Electrical connection
00ID9525	060G1122	PE 0 - 2.5 bar	G1/4 EN 837	REL ICS	DIN 43650. plug PG9
Korea	060G4062	PE 0 - 4 bar	G1/4 EN 837	ABS ICS	DIN 43650. plug PG9
91072075	060G4149	PE 0 - 4 bar	G1/2 EN 837	REL ICS	DIN 43650. plug PG9
96429180	060G4144	PE 0 - 4 bar	G1/2 EN 837	REL ICS	Cable 2 m
Korea	060G4063	PE 0 - 6 bar	G1/4 EN 837	ABS ICS	DIN 43650. plug PG9
00ID9527	060G4082	PE 0 - 6 bar	G1/4 EN 837	REL ICS	Cable 2 m
96429181	060G4148	PE 0 - 6 bar	G1/2 EN 837	REL ICS	Cable 2 m
96437851	060G4245	PE 0 - 6 bar	G1/2 EN 837	ABS ICS	Cable 2 m
91072076	060G4150	PE 0 - 6 bar	G1/2 EN 837	REL ICS	DIN 43650. plug PG9
Korea	060G4061	PE 0 - 10 bar	G1/4 EN 837	ABS ICS	DIN 43650. plug PG9
00ID9528	060G4083	PE 0 - 10 bar	G1/4 EN 837	REL ICS	Cable 2 m
96429182	060G4145	PE 0 - 10 bar	G1/2 EN 837	REL ICS	Cable 2 m
91072077	060G4161	PE 0 - 10 bar	G1/2 EN 837	ABS ICS	DIN 43650. plug PG9
Korea	060G4064	PE 0 - 16 bar	G1/4 EN 837	ABS ICS	DIN 43650. plug PG9
00ID9529	060G4084	PE 0 - 16 bar	G1/4 EN 837	ABS ICS	Cable 2 m
91072078	060G4152	PE 0 - 16 bar	G1/2 EN 837	ABS ICS	DIN 43650. plug PG9
96429183	060G4146	PE 0 - 16 bar	G1/2 EN 837	ABS ICS	Cable 2 m
96429184	060G4147	PE 0 - 25 bar	G1/2 EN 836	ABS ICS	Cable 2 m
91072079	060G4153	PE 0 - 25 bar	G1/2 EN 837	ABS ICS	DIN 43650. plug PG9
96485077	060G3520	PE 0 - 60 bar	G1/2 EN 837	ABS ICS	Cable 2 m
96437852	060G4248	PE 0...120 PSIG	1/2-14 NPT	ABS ICS	Cable 2 m special



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